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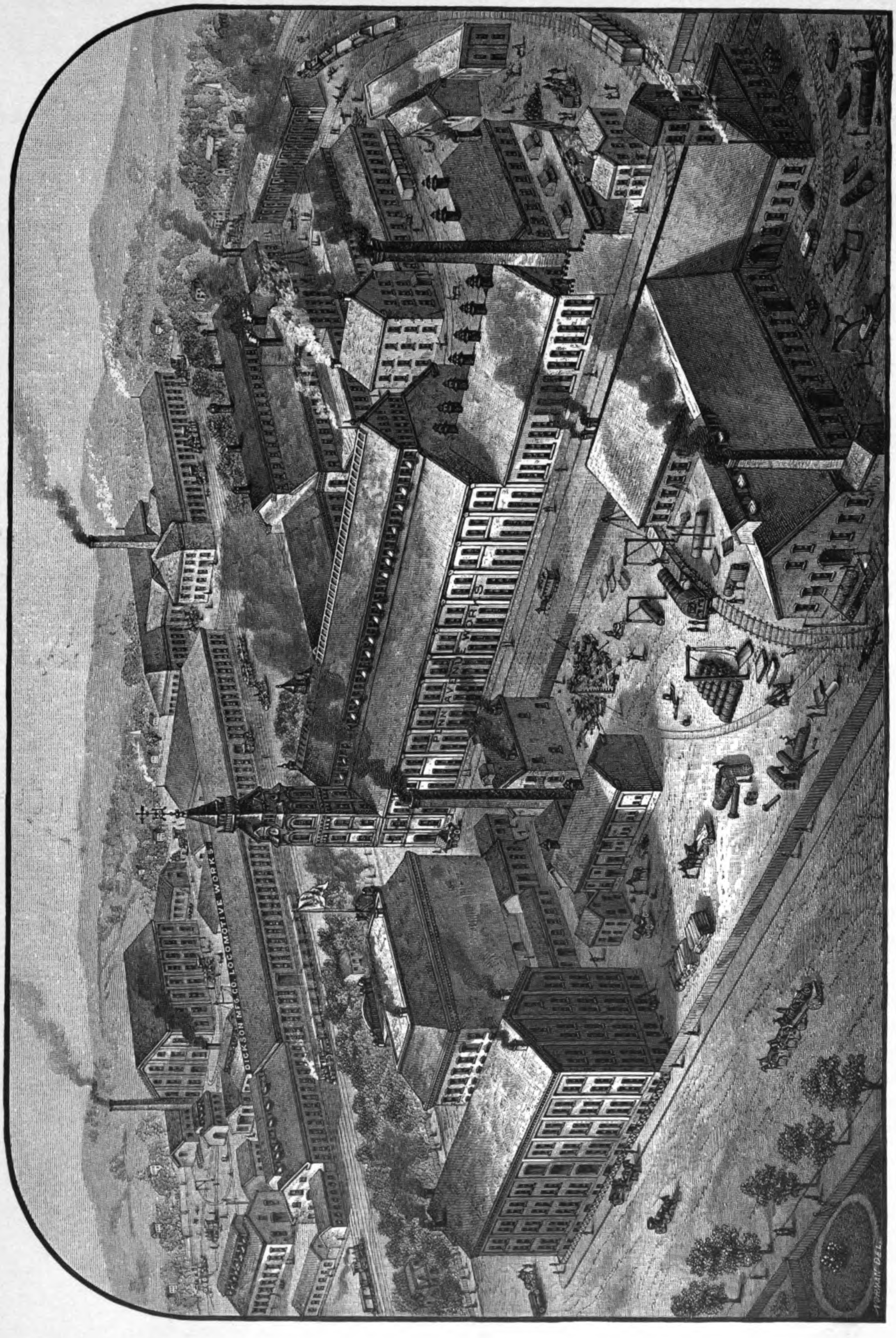
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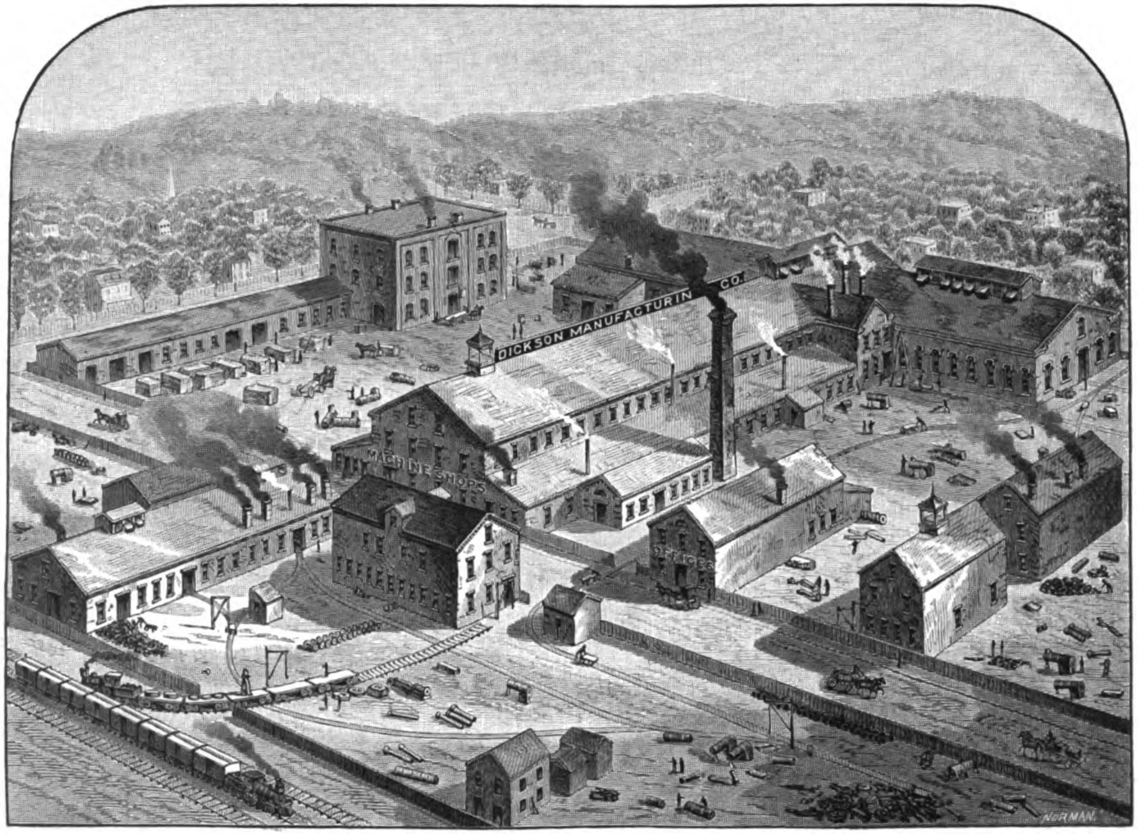

BIRDSEYE VIEW OF THE WILKES-BARRE SHOPS.

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ILLUSTRATED CATALOGUE

OF

LOCOMOTIVES

MANUFACTURED BY

THE DICKSON MANUFACTURING COMPANY,

Scranton and Wilkes-Barre, Pa.

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~~E. D. LEAVITT, Jr., D. M. E., Consulting Engine~~er.

~~G. W. WATTS, Mechanical Enginee~~r.

MARTIN B. BROWN PRINTER, 49 & 51 PARK PLACE, NEW YORK.

ADVERTISEMENT.

Separate Catalogues and Circulars are issued, and will be furnished upon application, containing particulars of

Standard Gauge Locomotives,
Narrow Gauge Locomotives,
Mine Locomotives for Outside and Inside Service,
Locomotives for Rolling Mills,
Contractors' Locomotives,
Plantation Locomotives,
Logging Locomotives,
Compressed Air Locomotives, and
Locomotives for any Special Service.

MACHINERY FOR THE TRANSMISSION OF POWER.

THE DICKSON MANUFACTURING COMPANY manufacture and issue illustrated catalogues of machinery for the transmission of power, including, among other things,

SHAFTS of steel, wrought iron, cast iron, and of Phœnix columns, for all purposes and of all sizes.

SHAFT COUPLINGS of all kinds.

SHAFT HANGERS of various kinds.

PEDESTALS of various kinds.

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CAST OR CUT SPUR AND BEVEL WHEELS.

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STRAIGHT AND CONICAL HOISTING DRUMS for all services.

INCLINED PLANE ROLLERS.

FRICTION CLUTCHES of various kinds.

STATIONARY STEAM ENGINES.

OVER 1,200 OF LARGE SIZES IN SERVICE.

Our steam engines are built at our Penn Avenue and Wilkes-Barre shops, and we have adopted in their construction a system of templets and gauges similar to that used in our locomotive practice, so that duplicates and renewals may be supplied cheaply and economically.

It is our aim to build stationary engines for *long, reliable and economical service;* and we can refer to many which have been running for over twenty years, and are still in use, without having suffered a serious break, or required any considerable repairs.

Our designs are constantly being improved by the suggestions of long experience and the progress of steam-engineering science, worked out by a skilled corps of designers. We use only the very best materials, and employ the most skillful mechanics obtainable, many of whom have been trained in our own shops.

Our facilities for constructing and erecting heavy work in our Penn Avenue shops, which we believe are unsurpassed, and our location in the midst of the anthracite coal region, where fuel costs only a nominal price, enable us to compete on favorable terms for such work.

Our line of steam-engine patterns embraces nearly every kind and size, from the common four-horse power vertical to the heaviest compound.

VERTICAL STEAM ENGINES,

of neat and mechanical design, from 4 H. P. to 75 H. P., with planed and with bored guides. Of heavy and strong proportions for ROLLING MILLS, FACTORIES, etc., up to the largest sizes.

HORIZONTAL STEAM ENGINES.

Box bed, with plain or balanced slide valve.
Girder bed, " "
Trunk bed, " "
" with variable cut off.
" with automatic cut off of superior design.
" high speed and automatic cut off for electric lighting.
" with improved Corliss valve gear.

HOISTING ENGINES,

especially designed for contractors' and mine service. These engines are built of great strength for heavy work, usually in pairs, and with either box or girder beds for the smaller sizes from 8″ x 10″ cylinders, to 24″ x 48″ cylinders, the larger sizes of the trunk bed, with bored guides. They are arranged with hoisting drums adapted to the work intended to be done, and provided with all the latest improvements for reversing and control. We have had a long experience in their use at shafts and slopes. The smaller sizes are especially adapted for sinking shafts.

COMPOUND ENGINES.

We build of the "Tandem" or "El Callao" type, of sizes adapted to the work to be done, or with the cylinders in pairs, with a double crank; also with vertical or inclined cylinders of various designs and the most approved valve gear.

PUMPING ENGINES.

Cornish pumping engines and pumps.

Geared pumping engines and pumps.

Water-works pumping engines and pumps of the best designs for high-pressure steam, and HIGH-DUTY COMPOUND ENGINES, of large capacity, from special designs. Our Consulting Engineer, Dr. E. D. Leavitt, Jr., has designed some of the largest and best pumping engines in use.

AIR COMPRESSORS,

to run by steam or other power, of all sizes, for use in mines and for the transmission of power.

BLAST ENGINES,

for Furnaces, Steel Works and Foundries. We have a large variety of patterns for these engines, both horizontal and vertical, single and double. These machines are now doing excellent service in various parts of the country. Blast engines of our make for PNEUMATIC TRANSMISSION, are now in use by the Western Union Telegraph Co. in New York City.

ROLLING-MILL ENGINES,

either double or three cylinder, horizontal or vertical, for reversing trains. Our proximity to the great rail mills has given us considerable experience in the requirements of the modern steel rail mill.

We shall be pleased to submit plans and estimates for special engines of all kinds. A special catalogue of steam engines is now in press.

BOILERS.

Our boiler shops are furnished with the most improved machines for working heavy and large boiler plate, consisting of power bending rolls, plate planers, multiple drills, heavy punches and shears, hydraulic riveters and Tweddell & Platt's hydraulic flanging machine, by means of which we are enabled to flange our boiler heads and flue sheets at one heat without overstraining the metal, and to secure uniformity in size.

We make boilers of all kinds and sizes, using only the best plate, of tested and guaranteed quality.

We have had large experience in designing boilers for the consumption of culm and the waste products of saw mills, factories and tanneries, and are enabled to guarantee a successful and satisfactory result from our designs.

We issue a special catalogue of the products of our boiler shops, which will be furnished on application to those desiring to purchase.

MINING MACHINERY.

Our mechanical engineers have had a long and extensive experience in designing machinery for mining of all kinds, and our stock of plans and patterns is large. Of extra heavy gears and pulleys adapted to the rough work of mines we have an especially large line of patterns.

We offer COAL-BREAKER DESIGNS.

COAL CRACKERS, with patent removable steel teeth and hydraulic extractors. We keep on hand a large stock of finished teeth for renewals, fitted to standards.

PHOSPHATE CRACKERS, fitted to standards.

COAL SCREENS, with Phœnix column shafts and cast-iron shafts.

VENTILATING FANS: the "Guibal," of all sizes.

HOISTING CARRIAGES, with patent safety catch, built very strong, and furnished with boiler-plate canopies, bridle chains and cast-iron landing fans.

BAILING BUCKETS.

HOISTING BUCKETS, with safety hooks.

COAL ELEVATORS. Chute plates.

MINE CARS, of wood or iron, of various designs. Car irons.

MINE-CAR WHEELS, FROGS, SWITCHES.

PUMP CHAMBERS and plungers.

COLUMN PIPE.

MINE SKIPS.

STAMP MILLS and AMALGAMATORS.

AIR COMPRESSORS and RECEIVERS.

STEAM and COMPRESSED AIR DRILLS.

ORE-ROASTING OVENS, and all kinds of machinery for MINING, HOISTING and TREATING COAL and ORES.

MISCELLANEOUS MACHINERY.

Our facilities for the designing and construction of general machinery, particularly that intended for heavy work, are unsurpassed.

FURNACES—We can supply with castings and the various iron work needed in their construction.

ROLLING MILLS and RAIL MILLS—We have done a great deal of work for both iron and steel mills, and have a large line of plans and patterns.

RAIL-PUNCHING AND RAIL-STRAIGHTENING MACHINES.

BESSEMER CONVERTERS—We can furnish of all sizes, with the appliances for handling.

HYDRAULIC LIFTS, for use about steel works.

HYDRAULIC CRANES.

HYDRAULIC RAIL-SAWING MACHINES.

HYDRAULIC PRESSES, for special and heavy duty.

PLATE-BENDING ROLLS, for heavy plate.

ALLIGATOR SHEARS, for cutting bar iron and scrap.

CABLE-ROAD MACHINERY.

Our twenty-five years' experience with wire-rope traction on the planes of the gravity railroads in this vicinity, and the slopes in the mines, has proved very valuable to us in the construction of cable-road machinery. We are prepared to offer plans and estimates for everything required for the machinery of cable roads, and refer to the traction machinery and engines in successful operation on the New York and Brooklyn Bridge, which were made by us, and, we believe, have not been excelled for economy and regularity anywhere. The engines were designed by us; the machinery by the engineers of the Bridge.

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* * *

HISTORICAL NOTICE.

EARLY in 1855, the anthracite coal business of the Lackawanna Valley had assumed such proportions that it was deemed necessary that a shop for repairing mining machinery and doing what little new work was needed should be started in the then southern portion of the Lackawanna coal region, and consequently, in February, 1856, Thomas, John A. and George L. Dickson, Maurice and Chas. P. Wurts, Joseph Benjamin and C. T. Pierson came to Scranton from Carbondale, and began the erection of foundry and machine shops, under the name of "Dickson & Co.," and in May of the same year ran the first heat of iron in their foundry, the amount melted being about two tons. They started with about thirty men, the greater number of whom were employed in the foundry. They also had a machine shop and small blacksmith shop. The first few years of the business were not very encouraging, and the complement of men remained about the same, with an average monthly pay roll of about $1,200. A small boiler shop was soon added to the works, but this increased the number of men only by about three, most of the work in that department being repairs for coal works. Notwithstanding the depression of 1857, the works managed to keep in operation, and were enlarged from time to time.

In 1862 the Company was incorporated under the name of "The Dickson Manufacturing Company," with an actual capital of $150,000, and an authorized capital of $300,000. The first officers of the Company were: President, Thomas Dickson; Secretary and Treasurer, George L. Dickson; Master Mechanic, John A. Dickson. The number of men employed the first year, *i. e.*, 1862, was about 150, the average daily melting of iron three tons, monthly pay roll about $7,500, and the sales for the first year were $200,000.

As the output of anthracite coal increased, the business of the Company increased with it, and, in 1862, they purchased of Messrs. Cooke & Co. the locomotive shops known as "The Cliff Works," which then had a capacity not exceeding five locomotives per year. In 1864 the "Planing mill" adjoining the Cliff Works was bought, and the manufacture of cars begun. At this time (1865) they employed about 400 men, the daily heats of iron were about four tons, the monthly disbursements to men about $16,000, and the sales over $600,000. In 1866 the foundry and machine shops of Messrs. Lanning & Marshall at Wilkes-Barre were purchased, and a branch established there. At these shops were manufactured car wheels and axles, and such repairs were executed as were needed about the coal works, the number of men employed there at that time being about sixty.

The business of the Company had so increased that in this year the capital was enlarged to $600,000, which, however, was not all issued until 1870.

In 1867 Mr. Thos. Dickson retired from the presidency, and Geo. L. Dickson was elected President in his stead. Mr. Jno. C. Phelps, of Wilkes-Barre, was made Vice-President, and Wm. H. Perkins, Secretary and Treasurer.

With the rapid growth in the valley the Company kept pace, the locomotive shops were enlarged, and in 1869 a large brick foundry was built at the Penn Avenue shops; this helped the business of the Cliff Works as well as the general work, and as additions had, from time to time, been made to the locomotive shops, their capacity was in 1870 four engines per month. The Company then employed about 500 men at their three places, the daily heats of iron aggregated about seven tons, the pay rolls were about $20,000, and the sales amounted to about $975,000. In 1874 the Cliff Works were destroyed by fire, entailing a great loss to the Company. The work of rebuilding was at once begun, and very much improved buildings replaced those burned down, new tools of the most modern design were put in, and the capacity of the shops increased to sixty locomotives per year. In 1876, the capital stock of the Company was further increased to $800,000, at which amount it now stands. In 1878 a large brick building, three stories high, was erected on the corner of Penn Avenue and Vine Street, to be used as a store for the sale of shop and mine supplies, general offices and storage house, and the upper floors for the storage of patterns. The depression of business from 1873 to 1878 was, of course, greatly felt, but all departments were kept at work with a not very large decrease of force. In 1880 about 600 men were employed, with a monthly pay roll of about $30,000, and the sales amounted to about $740,000 per year.

In 1882 Mr. G. L. Dickson resigned from the chair of the presidency and Mr. H. M. Boies was elected. In that year the work of rebuilding the Penn Avenue shops was commenced. A new machine shop was built, which is conceded by experts to be the best arranged shop, for the class of work done, in the country. It covers 223 feet by 100 feet of ground, of which space the machine shop proper occupies 196 feet by 97 feet, together with two galleries 25 feet wide running lengthwise of the building on both sides, giving altogether an available floor space of nearly 29,000 square feet. The remaining part of the ground on the Vine Street end of the building is occupied by a four-story building. In the first story of this building are found, besides the foreman's office in the tower, a large room for the storage of tools and finished work, and also a very well appointed wash room. On the second (or main) floor is the Superintendent's office, a large reading room for the men, and the paymaster's office. On the third floor is the office of the Mechanical Engineer, which has large storage facilities for drawings, the room being fire proof, and adjoining his office is a large, well-appointed draughting office.

A new brick pattern shop was also built, four stories in height (including the basement), 145 feet by 63 feet, the basement being used for storage of lumber, etc., and here also is the power for driving the shop. The first or main floor is used entirely for pattern work, and the upper floors for storage of lumber and patterns.

The Penn Avenue shops were equipped with new tools of the best and most modern design. There was placed in the boiler shop the Tweddell hydraulic system for flanging and riveting. This plant is more fully spoken of in the boiler department of the catalogue.

In 1883 the Company's sales amounted to over $1,400,000, while the average heat of pig iron was twenty-five tons per day.

At present about 1,200 men are employed, with an average monthly pay roll of $50,000.

The capacity of the different shops at the present time is about as follows:

PENN AVENUE SHOPS:—

600 tons iron melted per month.
100 stationary engines of all kinds with cylinders of 22 inches in diameter and over.
Mining machinery of all kinds.
Rolling-mill machinery of all kinds.
Blast-furnace and steel-works machinery.
Blast engines and air compressors.
Machine-shop machinery of all kinds.
Contractors' machinery of all kinds.
Water-works machinery of all kinds.
20 boilers per month, including locomotive boilers.
500 steel plate car wheels per month.

CLIFF WORKS:—

100 locomotives per year.

WILKES-BARRE SHOPS:—

150 stationary engines of all kinds with cylinders under 22 inches in diameter
Mining machinery of all kinds.
Wire-rope making machinery of all kinds.
Cornish pumps of all sizes.
50 cast-iron plate car wheels per day.
200 cylinder boilers per year.

SCRANTON, 1884.

PRICES.

The prices named herein supersede all previous lists, and are *Subject to Change Without Notice.*

The latest discounts will be given upon application.

TERMS.

All goods will be delivered free on track-cars or wagons at our works in Wilkes-Barre or Scranton, unless otherwise specified.

Boxing and packing extra, at cost.

Especial attention given to the preparation of machinery for ocean transportation.

Bills will be rendered on delivery, and are required to be paid, unless otherwise agreed, on or before the 20th of the succeeding month.

CIRCULAR OF THE LOCOMOTIVE DEPARTMENT.

GENERAL.

On the following pages we present particulars of locomotives adapted to nearly every variety of service.

Organization and Equipment.—The Locomotive Department of the Dickson Manufacturing Company is entirely separate and distinct in location and organization from the general works, and since its destruction by fire a few years since, has been rebuilt on a more extensive plan, and has been entirely equipped with new machinery from the best machine-tool makers in the country. We thus have the means of doing accurate and well-finished work, and by constant inspection and care of our machinery, excellence in results is secured.

Standards. Interchangeability.—We were among the first to adopt the system of constructing locomotive engines from standard templets and gauges, which we have perfected to such an extent as to guarantee that like parts of locomotives of the same class shall interchange.

Duplicates.—We use a fixed standard of measures and the United States standard screw threads, and can supply duplicate parts with dispatch by reference to the numbers cast or stamped on the various parts. Such a system evidently greatly facilitates repairs, and it enables locomotive users, by keeping a small stock of parts on hand, to reduce the expense of maintenance, and to keep their stock more constantly in service.

Durability.—A considerable experience in repairing locomotives in this vicinity has given us opportunities to discover the parts most likely to require renewing and repairing, and we have given special study in our designs to make these parts durable and easy of access.

METHODS OF MANUFACTURE.

Boilers.—Our Boiler Shop is furnished with the latest and best machinery, and includes a complete hydraulic plant for riveting and flanging the largest sheets.

Efficiency of Hydraulic Machinery.—The hydraulic system of riveting is acknowledged by experts to be the most efficient of the various systems in use, in consequence of the slow movement of the ram, the constancy of the force and the possibility of maintaining the pressure upon the rivet head without diminution until the rivet has set. The slow movement of the ram permits the material of the rivet to flow in a natural way, and experimental joints, which have been riveted by hand, by steam machines and by hydraulic machines, upon being cut through the rivets, invariably show the hydraulic closed rivet to have most perfectly filled the hole, and the plates to have been most perfectly brought together. Plates riveted in this way need less caulking than when riveted by the other systems.

Caulking.—Great care in caulking is taken, at all times, to prevent the under sheet from being injured, and the upper one from being bulged or forced away from the under.

Flanging by Machine.—Flanges turned by our machine are perfectly uniform in appearance, and the material is less likely to be damaged than when turned by hand, as the plate is heated evenly in a special furnace, and the action of the machine is such that the whole flange is turned quickly and simultaneously. This is particularly important with steel plate.

Other Machinery.—Besides the hydraulic machinery above mentioned, the boiler shop is provided with an ample stock of the usual machinery found in first-class boiler works, all of which is of great capacity and power.

Punching.—All punching is done with the Kennedy patent spiral punch, which in reality shears out the material, and thus diminishes, to a great extent, the injury which is known to be caused to the plate in the immediate vicinity of the hole by ordinary punching. The material thus preserves its original elastic limit, and the strength and durability of the joint is considerably increased.

Reaming and Drilling.—We are prepared, however, to undertake, for those who prefer it, to punch the rivet holes small and ream to size, either in place or not, or to drill the holes.

Joints.—We are constantly making boilers with all kinds of joints—simple lap, lap combined with a welt, and butt joints with one or two welts, either single or double riveted.

Steel Plate.—The steel boiler plate used by us is from the best makers, and is guaranteed to have an ultimate tensile strength of 60,000 pounds per square inch, and an elastic limit of 33,000 pounds per square inch.

Tests.—All boilers are subjected to a steam-pressure test before the lagging is put on.

Castings—Forgings.—We make all our own castings from materials best adapting them to the purpose for which they are intended, and forgings from the best refined iron. All hammered iron we make ourselves from No. 1 selected wrought scrap and new bar iron. Connecting rods and frame shapes are forged in one piece, and the jaws of the latter are welded on with a steam drop-hammer, which insures perfect work. All forgings are made in one piece when it is possible.

Brass.—Bearing brasses are made from our own mixtures, which have proved to be satisfactory. In short, it is our aim to use such materials and methods as will make our locomotives strong, durable, economical, and at as low prices as are consistent with these qualities.

Capacity of Works—The capacity of our shops is one hundred and twenty (120) of the ordinary "American" type locomotives per year.

Trials.—We send a competent man to connect and start locomotives.

EXPLANATION OF CLASSIFICATION.

Classification.—In addition to the general remarks on the preceding pages respecting our locomotives, we present the following pages of general specifications of various classes for which we have patterns. The classification is as follows:

CLASS A. 4 coupled wheels locomotive.
" B. 4 coupled wheels locomotive, with a leading 2-wheeled truck.
" C. "American" type of locomotive, having 4 driving wheels and 4 leading truck wheels.
" D. 6 coupled wheels locomotive.
" E. "Mogul" locomotive, having 6 wheels coupled and a 2-wheeled leading truck.
" F. "Ten-Wheel" locomotive, having 6 wheels coupled and a 4-wheeled leading truck.
" G. Locomotive having 8 driving wheels and no truck.
" H. "Consolidation" type of locomotive, having 8 wheels coupled and a 2-wheeled leading truck.
" I. 4 wheels coupled tank switching locomotive, with a 2-wheeled truck behind the driving wheels.
" J. Double-end tank locomotive, with 4 wheels coupled and a 2-wheeled truck at each end.
" K. Tank locomotive of the "Forney" type, having 4 wheels coupled and a trailing 4-wheeled truck under the tank.
" L. Double-end tank locomotive, the same as class K, except with the addition of a leading 2-wheeled truck.
" M. 6 coupled wheels tank switching locomotive, with a trailing 2-wheeled truck.
" N. Same as M, except with the addition of a leading 2-wheeled truck.
" O. 6 coupled wheels "Forney" tank locomotive, with a trailing 4-wheeled truck under the tank.
" P. 6 coupled wheels tank locomotive, with a leading 2-wheeled truck and a trailing 4-wheeled truck, the latter under the tank.

A number prefixed to a class letter indicates the diameter of the cylinder in inches; thus, 18-C means an "American" type locomotive, with cylinders 18 inches in diameter; 20-H means a "Consolidation" type locomotive, with cylinders 20 inches in diameter.

The above classification refers to locomotives of the 4 feet 8½-inch gauge, and narrower gauges.

Special Classes.—Besides the above-enumerated classes of locomotive, we are prepared to build from special specifications, and from drawings furnished by customers.

Orders.—Orders for locomotives should be accompanied with the following particulars:

1. Gauge of track—exact inside distance between the rails.
2. Limitations of dimensions imposed by tunnels, bridges, etc.
3. Kind and height of car couplings.
4. Kind of fuel to be used.
5. Shipping directions.

Cost of Delivery.—Delivery at any place accessible by rail or water transportation will be included in propositions, if desired.

Other Classes.—We also manufacture locomotives for the following kinds of service, viz.:

MINING, OUTSIDE AND INSIDE USES.
FURNACE.
LOGGING.
PLANTATION.
COMPRESSED-AIR LOCOMOTIVES.

HAULING CAPACITIES.

NOTE.—The hauling capacities of the different locomotives given in the tables which follow, are based upon the assumptions that the resistance of a train is six pounds per ton of weight when moving at five to ten miles per hour, and that the adhesion is equal to one-fifth of the weight on the driving wheels—conditions which are likely to be realized in practice. We have not thought it wise to assume exceptional conditions, but if they should exist, it is obvious that they will be utilized as well as is compatible with the boiler and cylinder capacities, and the weight on the driving wheels. Tables based upon uncommon conditions are only misleading, and with this feeling uppermost, we have considered it inexpedient to publish any letters relating to the work which our locomotives have done, preferring to let every-day facts speak for themselves. We know that our locomotives will haul as heavy loads and keep up their steam as well as any of the same leading dimensions and weights.

The *Grades* given throughout the catalogue are in feet per mile.

CATALOGUE OF

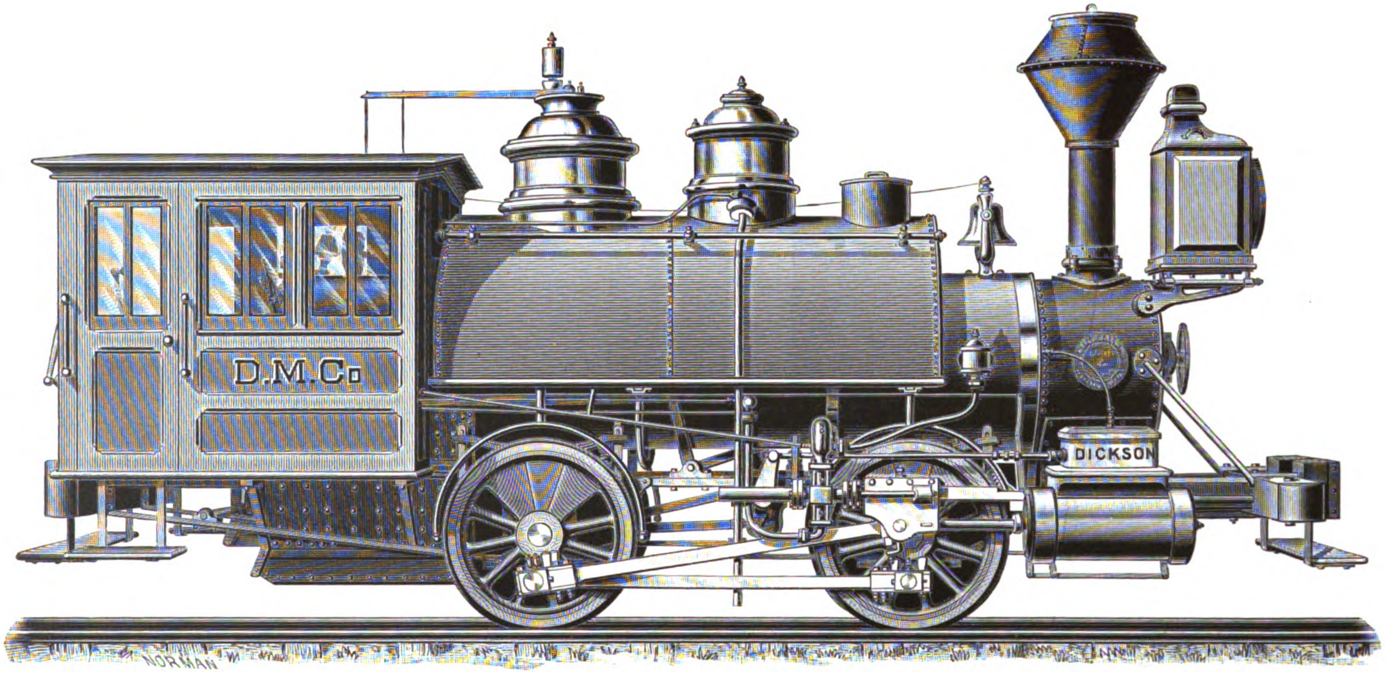
STANDARD GAUGE LOCOMOTIVES

WHICH ARE BUILT

To Run on Tracks of 4 Feet 8½ Inch Gauge, or Wider.

FOUR WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS A.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

FOUR WHEELS TANK SWITCHING LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES, OR WIDER. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	9–A	10–A	11–A	12–A	13–A	14–A	15–A	16–A
Cylinders, Diameter	9″	10″	11″	12″	13″	14″	15″	16″
〃 Stroke	14″ or 16″	16″	16″	18″ to 22″	20″ or 22″	22″	22″	22″ or 24″
Diameter of Driving Wheels	29″ to 36″	30″ to 36″	33″ to 43″	36″ to 45″	36″ to 48″	42″ to 50″	42″ to 50″	42″ to 50″
Wheel Base, Rigid	5′ 6″	6′ 0″	6′ 0″	7′ 0″	7′ 0″	7′ 0″	7′ 6″	7′ 6″
Length of Engine	19′ 5″	20′ 8″	21′ 7″	24′ 6″	24′ 9″	25′ 2″	26″ 2″	26′ 8″
Weight, Loaded, Total	28,000 lbs.	33,000 lbs.	38,000 lbs.	44,000 lbs.	50,000 lbs.	56,000 lbs.	62,000 lbs.	68,000 lbs.
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.	660 gal.	700 gal.
Hauling Capacity on Level	650 tons.	750 tons.	875 tons.	1,000 tons.	1,150 tons.	1,275 tons.	1,425 tons.	1,550 tons.
〃 〃 20 ft. Grade	315 〃	360 〃	420 〃	480 〃	555 〃	615 〃	685 〃	750 〃
〃 〃 40 ft. 〃	210 〃	240 〃	280 〃	320 〃	370 〃	410 〃	460 〃	500 〃
〃 〃 60 ft. 〃	155 〃	180 〃	210 〃	240 〃	275 〃	305 〃	340 〃	370 〃
〃 〃 80 ft. 〃	120 〃	140 〃	165 〃	190 〃	215 〃	240 〃	270 〃	295 〃
〃 〃 100 ft. 〃	100 〃	115 〃	135 〃	155 〃	180 〃	200 〃	225 〃	245 〃
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

TANK SWITCHING LOCOMOTIVE.

CLASS A.

We present herewith the general dimensions, weights and hauling capacities of a number of the common sizes of the Four-Wheel Tank Switching Engine for the 4′ 8½″ gauge. This type of engine is designed specially for switching service in yards and stations, but can be used for short local runs.

The tank is placed on top of the boiler in order to utilize the weight for adhesion, and to dispense with a tender. By means of this construction the engine is short, and the engine men can observe yard operations somewhat better than if the engine were provided with a tender. The weight is equally distributed on all driving wheels, and there is a transverse equalizing beam connecting the springs of the forward driving wheels, an arrangement which contributes to steady motion and ease on the rails.

On the next page are given general specifications of this engine as we build them without special instructions.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top with one dome, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted on top of boiler.

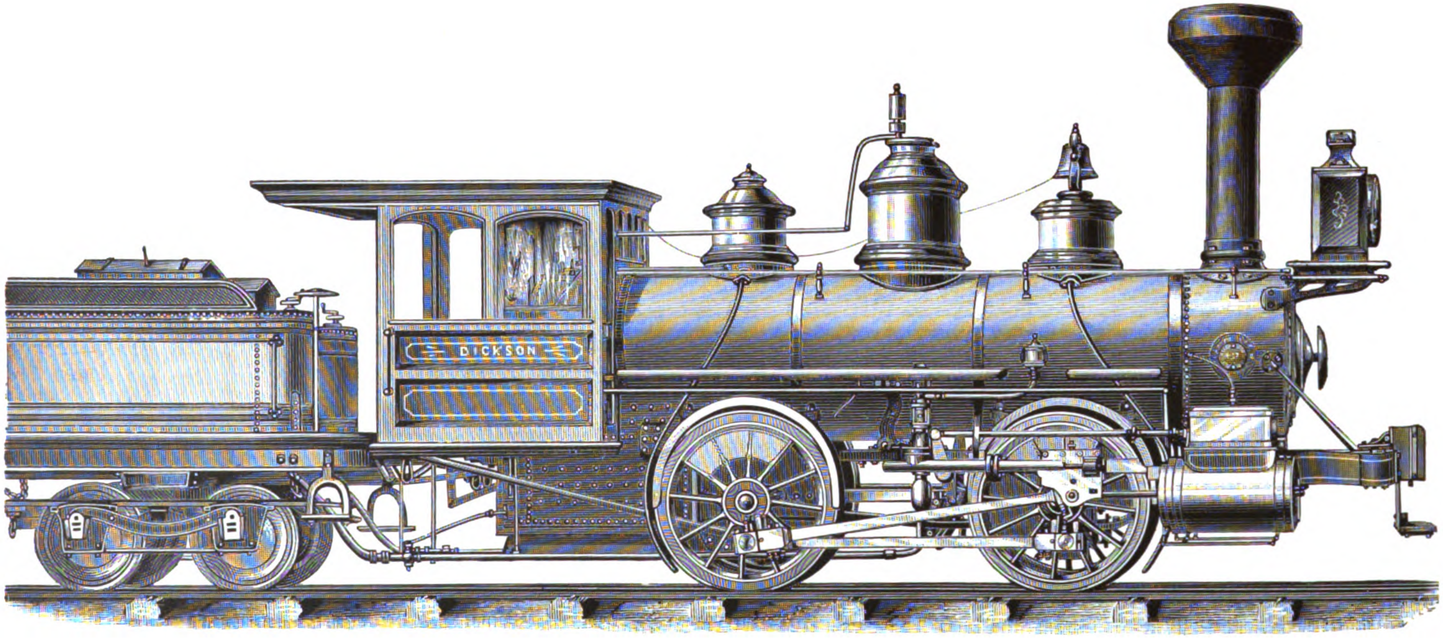
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

FOUR WHEELS COUPLED SWITCHING LOCOMOTIVE,

WITH TENDER. CLASS A.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

FOUR WHEELS COUPLED SWITCHING LOCOMOTIVE—WITH TENDER.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	9—A	10—A	11—A	12—A	13—A	14—A	15—A	16—A
Cylinders, Diameter	9″	10″	11″	12′	13″	14″	15″	16″
" Stroke	14″ or 16″	16″	16″	18″ to 22″	20″ or 22″	22″	22″	22″ or 24″
Diameter of Driving Wheels	29″ to 36″	30″ to 36″	33″ to 48′	36″ to 45″	36″ to 48″	42″ to 50″	42″ to 50″	42″ to 50″
Wheel Base	5′ 6″	6 ft.	6 ft.	7 ft.	7 ft.	7 ft.	7′ 6″	7′ 6″
" " Engine and Tender	23′ 1½″	24′ 7½″	29′ ½″	30′ 6″	31′ 2″	31′ 11″	33′ 1″	33′ 8″
Length of " " "	31′ 11″	33′ 8″	38′ 4½″	41′ 3″	42′ 3″	43′ 2″	44′ 6″	45′ 4″
Weight, Loaded, Total	21,000 lbs.	25,000 lbs.	30,000 lbs.	36,000 lbs.	41,000 lbs.	46,000 lbs.	51,000 lbs.	56,000 lbs.
Capacity of Tank	600 gal.	700 gal.	800 gal.	1,000 gal.	1,200 gal.	1,400 gal.	1,600 gal.	1,800 gal.
Hauling Capacity on Level	520 tons.	620 tons.	740 tons.	890 tons.	1,010 tons.	1,130 tons.	1,255 tons.	1,380 tons.
" " 20 ft. Grade	250 "	295 "	355 "	425 "	480 "	540 "	595 "	660 "
" " 40 ft. "	165 "	195 "	235 "	280 "	315 "	355 "	395 "	435 "
" " 60 ft. "	120 "	145 "	170 "	205 "	230 "	260 "	285 "	315 "
" " 80 ft. "	95 "	115 "	135 "	170 "	180 "	205 "	225 "	245 "
" " 100 ft. "	80 "	95 "	110 "	130 "	145 "	165 "	180 "	205 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

FOUR-WHEEL SWITCHING LOCOMOTIVE.

CLASS A.

WITH TENDER.

We illustrate and give capacities of our Four-Wheel Switching Locomotive, with Tender, on the two preceding pages. It is designed for switching service in yards or stations, and can also be used for short runs on local roads.

The weight of the engine is equally distributed among the four driving wheels, and the front ends of the forward springs are connected by a transverse equalizing lever, which contributes to steadiness of motion and ease upon the road bed.

The tender is built with six wheels or two four-wheeled trucks.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top with one dome, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors, as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, secured to wrought iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes of cast iron with cast brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

TANK—Of ample capacity, made straight on top with flanges on sides and back, or made sloping on back to give the engineer a clear view in the rear. Mounted on either an oak or an iron frame, with four or six wheels, or two four-wheel trucks; wheels double plate, chilled face, hammered iron axles with brass bearings.

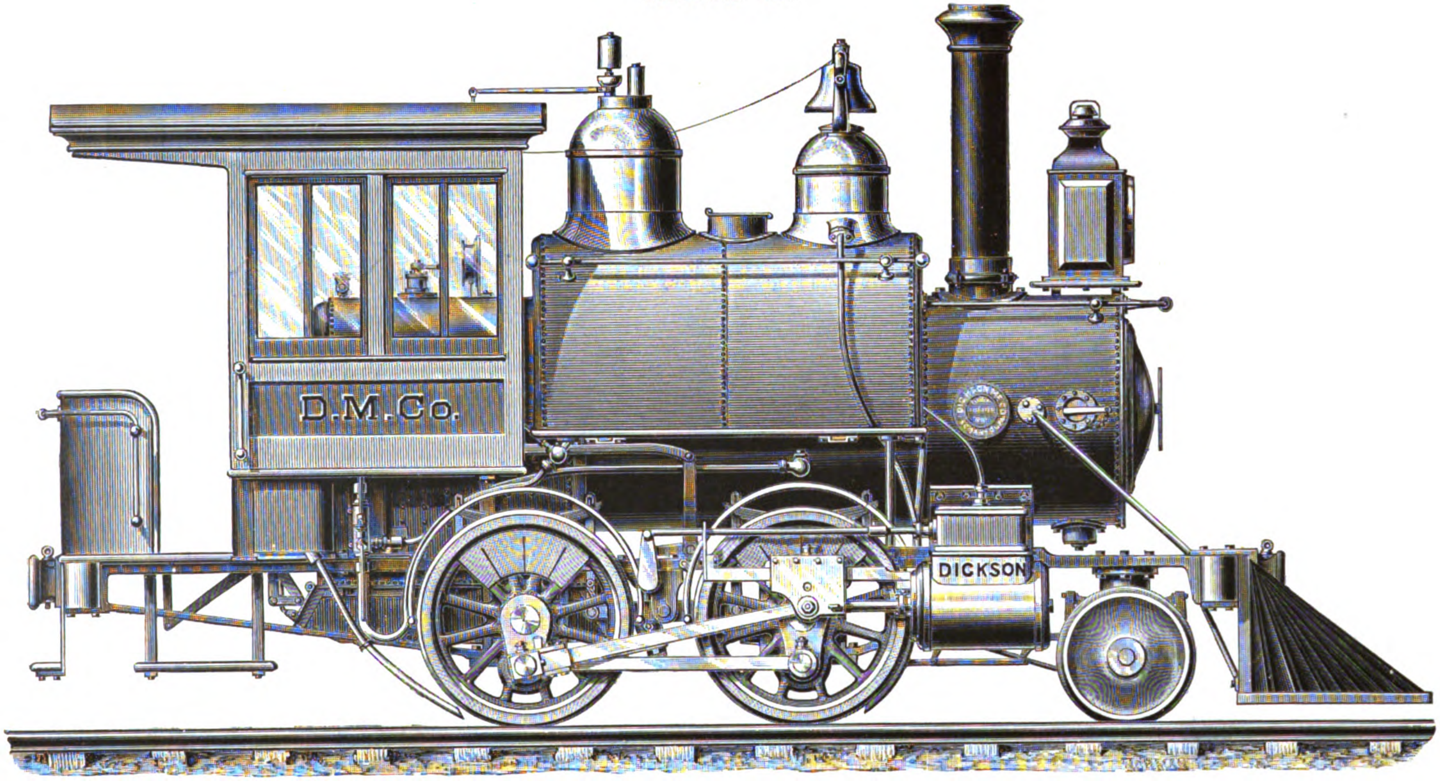
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

TANK SWITCHING ENGINE.

CLASS B.



Gauge, 4 Feet 8½ Inches.

FUEL, COAL OR WOOD.

TANK SWITCHING ENGINE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS.	10—B	11—B	12—B	13—B	14—B	15—B	16—B	17—B
Cylinders, Diameter	10"	11"	12"	13"	14"	15"	16"	17"
" Stroke	16"	16"	18"	20"	22"	22"	22" or 24"	22" or 24"
Diameter of Driving Wheels	33" to 40"	36" to 42"	36" to 45"	36" to 48"	40" to 50"	42" to 54"	42" to 54"	44" to 56"
" Truck Wheels	22" to 24"	24" to 26"	24" to 26"	24" to 28"	26" to 30"	26" to 30"	26" to 30"	28" to 30"
Wheel Base, Rigid	5' 3"	5' 6"	5' 9"	6' 0"	6' 6"	7' 0"	7' 6"	7' 6"
" " Total	11' 1"	11' 6"	12' 2"	12' 10"	13' 7"	14' 3"	15' 0"	15' 6"
Length of Engine without Pilot	20' 10"	21' 10"	23' 0"	24' 3"	25' 3"	26' 3"	27' 6"	28' 6"
" " with one Pilot	23' 6"	24' 9"	26' 0"	27' 3"	28' 3"	29' 6"	30' 9"	31' 9"
Weight, Loaded, Total	34,000 lbs.	40,000 lbs.	46,000 lbs.	52,000 lbs.	58,000 lbs.	64,000 lbs.	70,000 lbs.	76,000 lbs.
" " on Drivers	26,000 "	31,000 "	36,000 "	42,000 "	47,000 "	53,000 "	58,000 "	64,000 "
" " on Trucks	8,000 "	9,000 "	10,000 "	10,000 "	11,000 "	11,000 "	12,000 "	12,000 "
Capacity of Tank	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.	700 gal.	800 gal.	900 gal.
Hauling Capacity on Level	600 tons.	725 tons.	850 tons.	975 tons.	1,100 tons.	1,250 tons.	1,400 tons.	1,550 tons.
" " 20 ft. Grade	290 "	350 "	410 "	460 "	530 "	605 "	680 "	750 "
" " 40 ft. "	195 "	235 "	275 "	315 "	355 "	405 "	455 "	500 "
" " 60 ft. "	145 "	175 "	205 "	235 "	265 "	300 "	335 "	370 "
" " 80 ft. "	115 "	140 "	160 "	185 "	210 "	240 "	265 "	295 "
" " 100 ft. "	95 "	115 "	135 "	155 "	175 "	200 "	220 "	245 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

TANK SWITCHING LOCOMOTIVE.

CLASS B.

The Class " B " Tank Switching Locomotive, of which we present the leading particulars of various sizes, is designed chiefly for switching purposes, but can be used to draw suburban service trains with satisfaction on account of the leading swing-bolster, radius-bar truck. This keeps the engine steady at the higher speeds, and allows it to take curves with ease.

General specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable. heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axle; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

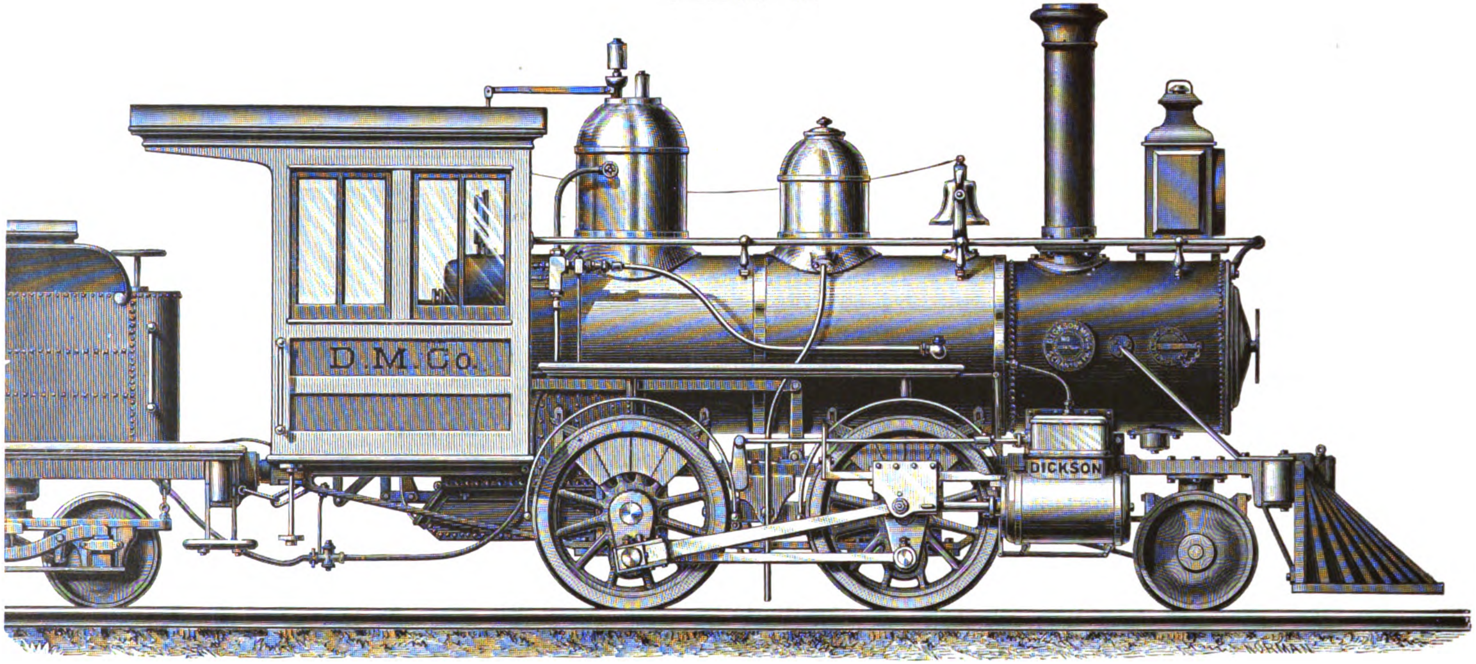
TANK.—Mounted on top of boiler.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

Passenger or Switching Engine—With Tender.

CLASS B.



Gauge, 4 Feet 8½ Inches.

FUEL, COAL OR WOOD.

PASSENGER OR SWITCHING ENGINE—WITH TENDER.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS.	10—B	11—B	12—B	13—B	14—B	15—B	16—B	17—B
Cylinders, Diameter	10"	11"	12"	13"	14"	15"	16"	17"
" Stroke	16"	16"	18"	20"	22"	22"	22" or 24"	22" or 24"
Diameter of Driving Wheels	33" to 40"	36" to 42"	36" to 45"	36" to 48"	40" to 50"	42" to 54"	42" to 54"	44" to 56"
" Truck Wheels	22" to 24"	24" to 26"	24" to 26"	24" to 28"	26" to 30"	26" to 30"	26" to 30"	28" to 30"
Wheel Base, Rigid	5' 3"	5' 6"	5' 9"	6' 0"	6' 6"	7' 0"	7' 6"	7' 6"
" " Total	11' 1"	11' 6"	12' 2"	12' 10"	13' 7"	14' 3"	15' 0"	15' 6"
" " Engine and Tender	27' 0"	31' 9"	32' 0"	34' 4"	35' 10"	37' 1"	38' 6"	39' 6"
Length of Engine and Tender, one Pilot	35' 0"	39' 10"	41' 0"	43' 3"	44' 9"	46' 4"	47' 9"	48' 9"
Weight, Loaded, Total	28,000 lbs.	33,000 lbs.	38,000 lbs.	43,000 lbs.	48,000 lbs.	53,000 lbs.	58,000 lbs.	63,000 lbs.
" " on Drivers	21,000 "	26,000 "	30,000 "	35,000 "	40,000 "	45 000 "	49,000 "	54,000 "
" " on Trucks	7,000 "	7,000 "	8,000 "	8,000 "	8,000 "	8,000 "	9,000 "	9,000 "
Capacity of Tank	900 gal.	1,000 gal.	1,100 gal.	1,200 gal.	1,400 gal.	1,600 gal.	1,800 gal.	2,000 gal.
Hauling Capacity on Level	515 tons.	640 tons.	735 tons.	860 tons.	985 tons.	1,105 tons.	1,205 tons.	1,330 tons.
" " 20 ft. Grade	245 "	305 "	350 "	410 "	470 "	525 "	575 "	635 "
" " 40 ft. "	160 "	200 "	230 "	270 "	310 "	345 "	375 "	415 "
" " 60 ft. "	115 "	145 "	165 "	195 "	225 "	250 "	275 "	305 "
" " 80 ft. "	90 "	115 "	130 "	150 "	175 "	195 "	215 "	235 "
" " 100 ft. "	75 "	95 "	105 "	125 "	145 "	160 "	175 "	195 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

PASSENGER OR SWITCHING ENGINE.

CLASS B.

The Class "B" Passenger or Switching Engine, of which particulars are herewith given, is designed for the passenger or general service of suburban or branch roads, or for switching service. The leading truck, which has a swing bolster and radius bar, keeps the engine steady at the higher speeds, and allows it to take curves with ease.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

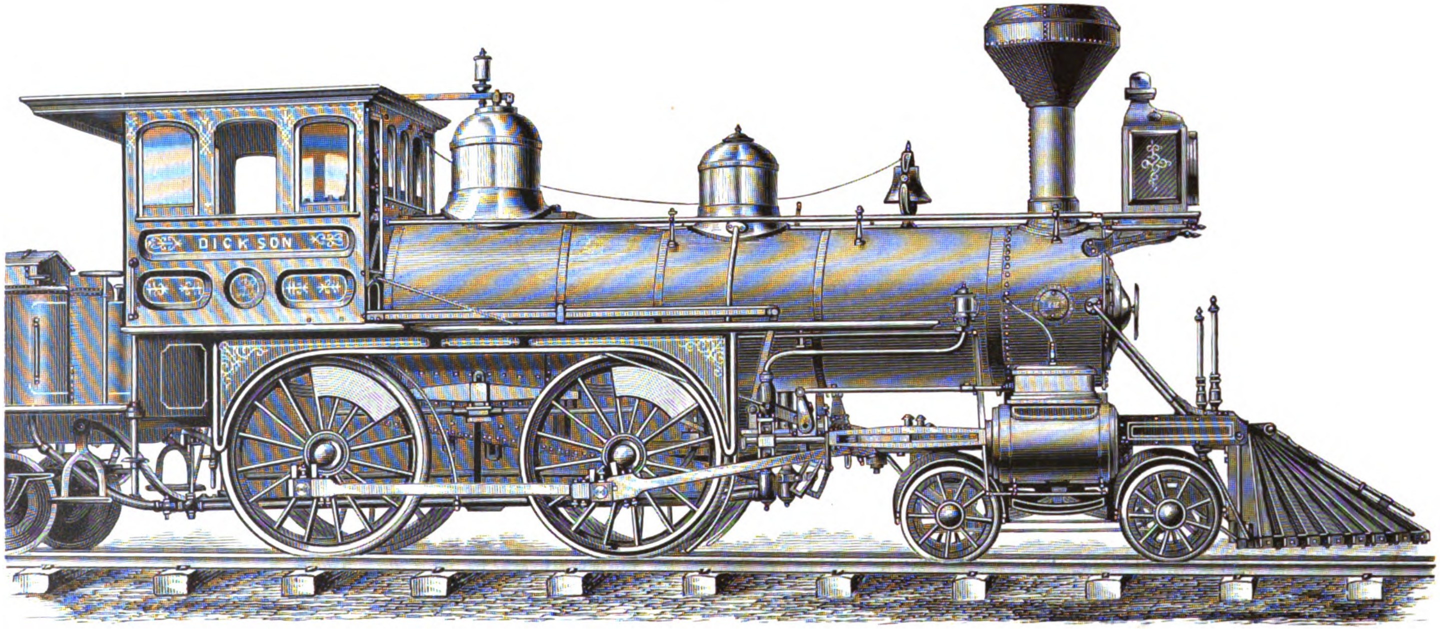
TANK.—Mounted on oak or iron frame, with four wheels or two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

"AMERICAN" TYPE LOCOMOTIVE—FOR PASSENGER OR FREIGHT SERVICE.

CLASS C.



GAUGE, 4 FEET 8½ INCHES.

FUEL, ANTHRACITE COAL.

"AMERICAN" TYPE LOCOMOTIVE—FOR PASSENGER OR FREIGHT SERVICE.

GAUGE, 4 FEET 8½ INCHES. FUEL, ANTHRACITE COAL.

DIMENSIONS AND CAPACITIES OF NINE SIZES OF THIS CLASS.

CLASS	12–C	13–C	14–C	15–C	16–C	17–C	18–C	19–C	20–C
Cylinders, Diameter	12"	13"	14"	15"	16"	17"	18"	19"	20"
" Stroke	20" to 22"	20" to 22"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"
Diameter of Driving Wheels	44" to 56"	48" to 60"	48" to 62"	56" to 60"	56" to 68'	56" to 68"	56" to 68"	56" to 68"	56" to 72"
" Truck Wheels	24" to 26"	24" to 28"	26" to 28"	26" to 28"	26" to 30"	26" to 30"	26" to 30"	26" to 30"	26" to 30"
Wheel Base, Rigid	6' 6"	7' 0"	7' 3"	7' 6"	7' 6"	8' 0"	8' 3"	8' 6"	8' 9"
" " Total	19' 6"	20' 4"	20' 10"	21 2"	21' 2'	21' 11"	22' 3'	22' 8"	22' 11"
" " Engine and Tender	40' 4"	41' 2"	41' 8"	41' 3"	42' 3'	44' 2"	45' 0"	46' 6"	47' 6"
Length of Engine and Tender	48' 11"	49' 9'	50' 11"	49' 8"	50' 8"	53' 10'	54' 8"	56' 1"	57' 3"
Weight, Loaded, Total	48,000 lbs.	53,000 lbs.	58,000 lbs.	64,000 lbs.	70,000 lbs.	76,000 lbs.	83,000 lbs.	90,000 lbs.	98,000 lbs.
" " on Drivers	32,000 "	35,000 "	39,000 "	44,000 "	48,000 "	53,000 "	60,000 "	66,000 "	73,000 "
" " on Truck	16,000 "	18,000 "	19,000 "	20,000 "	22,000 "	23,000 "	23,000 "	24,000 "	25,000 "
Capacity of Tank	1,400 gal.	1,500 gal.	1,800 gal.	2,000 gal.	2,000 gal.	2,400 gal.	2,600 gal.	2,800 gal.	3,000 gal.
Hauling Capacity on Level	785 tons.	855 tons.	955 tons.	1,075 tons.	1,175 tons.	1,300 tons.	1,470 tons.	1,620 tons.	1,800 tons.
" " 20 ft. Grade	370 "	405 "	450 "	505 "	555 "	615 "	695 "	770 "	855 "
" " 40 ft. "	235 "	265 "	295 "	330 "	365 "	405 "	455 "	505 "	560 "
" " 60 ft. "	175 "	190 "	215 "	240 "	265 "	295 "	330 "	365 "	410 "
" " 80 ft. "	135 "	145 "	165 "	185 "	205 "	230 "	255 "	285 "	320 "
" " 100 ft. "	110 "	120 "	135 "	150 "	165 "	185 "	205 "	230 "	260 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$	$

"AMERICAN" TYPE LOCOMOTIVE.

CLASS C.

FUEL, ANTHRACITE COAL.

We devote the two preceding pages to representations and particulars of what has been of late years called, by general consent, the "American" type of locomotive, as we build them for burning anthracite coal. It has received the name, not because engines nearly identical in design with it have not been used in other countries, but because it is extremely popular and common in the United States, and is regarded here as the most fit type for conducting nearly all passenger service, and all freight service within the limits of its capacity. As offered by the best builders it is probably the cheapest machine for its weight and power made, and there is but little opportunity for distinguishing characteristics as designed by different manufacturers.

The forward end of the locomotive rests on a pivot on the truck which permits the truck to turn and accommodate itself to curvature of track, and on crooked or poorly aligned roads the pivot is permitted to have some lateral movement by means of the "swing bolster" of the truck. The rear end of the engine rests on the driving wheels, through the intervention of equalizing levers or beams, the effect of which arrangement, it can be shown, is that each side of the back end of the locomotive rests on a single point. This property, taken in connection with the central support at the truck, is very important, as it is equivalent to the whole locomotive resting on three points, an arrangement which is in accordance with the mechanical principle that when a body rests on three points it is absolutely free to accommodate itself to them. It should also be stated that an effect of equalizing beams is to give the wheels great vertical flexibility in their movements when passing over inequalities of the track.

In the larger sizes of this locomotive the fire box is placed entirely above the frame, in order to gain grate surface. When this is done, the frame slants down as it goes from the back to the forward axle, and joins the jaw opposite the axle center. This enables the proper depth of fire box to be secured forward.

To the features of the design of this type of locomotive, as briefly described above, are to be ascribed its success in this country, as it will run steadily and keep on tracks so poorly constructed as to cause a less flexible engine to leave the rails.

On the following page we present general specifications of this type of engine as we build them in the absence of special directions.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

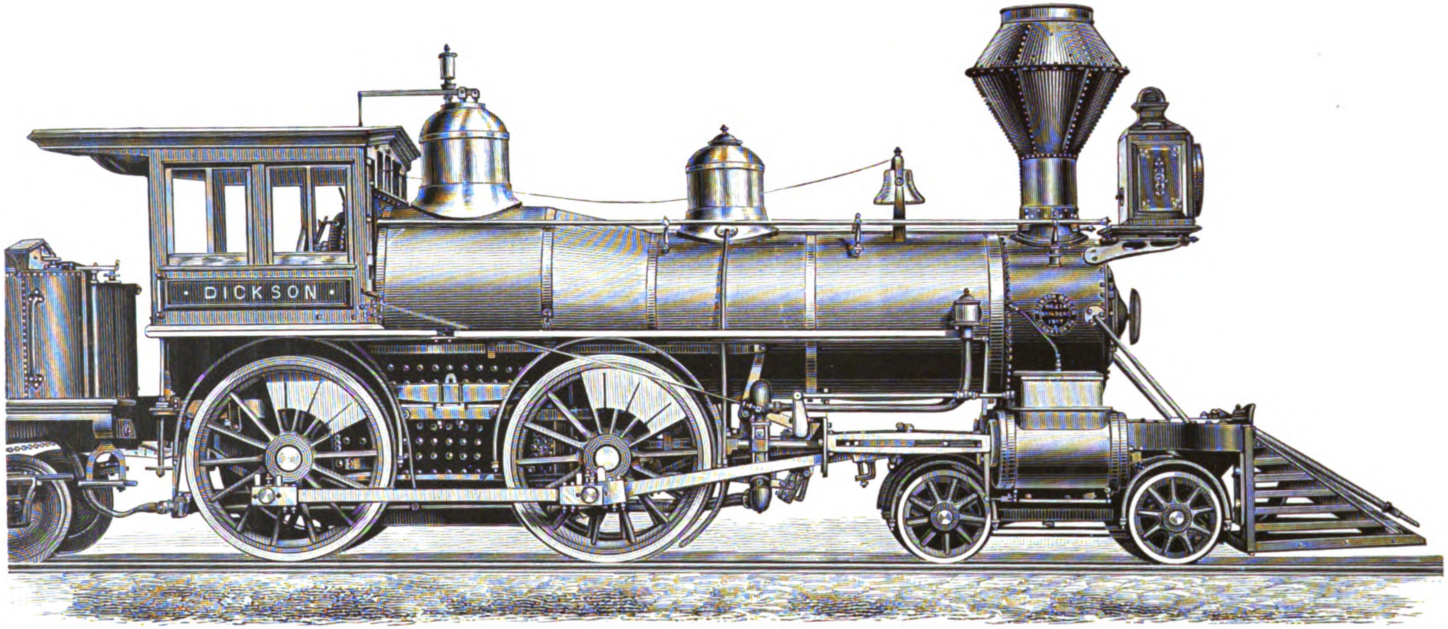
TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups,

"AMERICAN" TYPE LOCOMOTIVE—FOR PASSENGER OR FREIGHT SERVICE.

CLASS C.



GAUGE, 4 FEET 8½ INCHES.

FUEL, BITUMINOUS COAL, OR WOOD.

"AMERICAN" TYPE LOCOMOTIVE.

FUEL, BITUMINOUS COAL, OR WOOD.
GAUGE, 4 FEET 8½ INCHES.

DIMENSIONS AND CAPACITIES OF TEN SIZES OF THIS CLASS.

CLASS	10-C	11-C	12-C	13-C	14-C	15-C	16-C	17-C	18-C	19-C
Cylinders, Diameter	10"	11"	12"	13"	14"	15"	16"	17"	18"	19"
" Stroke	18" to 20"	18" to 20"	20" to 22"	20" to 22"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"
Diameter of Driving Wheels	44" to 56"	44" to 56"	44" to 56"	48" to 60"	48" to 62"	56" to 66"	56" to 68"	56" to 68"	56" to 68"	56" to 68"
" " Truck Wheels	24" to 26"	24" to 26"	24" to 26"	24" to 28"	26" to 28"	26" to 28"	26" to 30"	26" to 30"	26" to 30"	26" to 30"
Wheel Base Rigid	5'-6"	6' ft.	6'-6"	7' ft.	7'-3"	7'-6"	8' ft.	8'-3"	8'-6"	8'-9"
" " Total	17'-3"	18'-9"	19'-6"	20'-4"	20'-10"	21'-2"	21'-8"	22'-2"	22'-5"	22'-11"
" " Engine and Tender	36'-3"	37'-11"	38'-8"	39'-8"	40'-5"	40'-9"	41'-3"	41'-9"	43' ft.	43'-7"
Length of Engine and Tender	44'-6"	46'-2"	46'-11"	48'-3"	48'-8"	49'-2"	49'-8"	51'-5"	53' ft.	53'-7"
Weight Loaded, Total	37,000 lbs.	42,000 lbs.	46,000 lbs.	50,000 lbs.	55,000 lbs.	60,000 lbs.	65,000 lbs.	72,000 lbs.	79,000 lbs.	86,000 lbs.
" " on Drivers	24,000 lbs.	28,000 lbs.	30,000 lbs.	33,000 lbs.	37,000 lbs.	40,000 lbs.	43,000 lbs.	48,000 lbs.	53,000 lbs.	58,000 lbs.
" " " Trucks	13,000 lbs.	14,000 lbs.	16,000 lbs.	17,000 lbs.	18,000 lbs.	20,000 lbs.	22,000 lbs.	24,000 lbs.	26,000 lbs.	28,000 lbs.
Capacity of Tank	1,000 gal.	1,100 gal.	1,400 gal.	1,500 gal.	2,000 gal.	2,000 gal.	2,200 gal.	2,400 gal.	2,600 gal.	2,800 gal.
Hauling Capacity on Level	585 tons.	685 tons.	735 tons.	805 tons.	905 tons.	975 tons.	1,050 tons.	1,175 tons.	1,295 tons.	1,420 tons.
" " 20 ft. Grade	275 "	325 "	350 "	380 "	430 "	460 "	495 "	555 "	610 "	770 "
" " 40 ft. "	180 "	210 "	230 "	250 "	280 "	300 "	325 "	365 "	400 "	440 "
" " 60 ft. "	130 "	155 "	165 "	180 "	206 "	215 "	235 "	265 "	290 "	320 "
" " 80 ft. "	100 "	120 "	130 "	140 "	155 "	165 "	180 "	205 "	225 "	245 "
" " 100 ft. "	80 "	95 "	105 "	110 "	125 "	135 "	145 "	165 "	180 "	200 "
Price ready for service at Works in Scranton	$	$	$	$	$	$	$	$	$	$

"AMERICAN" TYPE LOCOMOTIVE.

CLASS C.

FUEL, BITUMINOUS COAL, OR WOOD.

On the two preceding pages we present an engraving and particulars of the "American" type of locomotive, as built by us for burning bituminous coal, or wood.

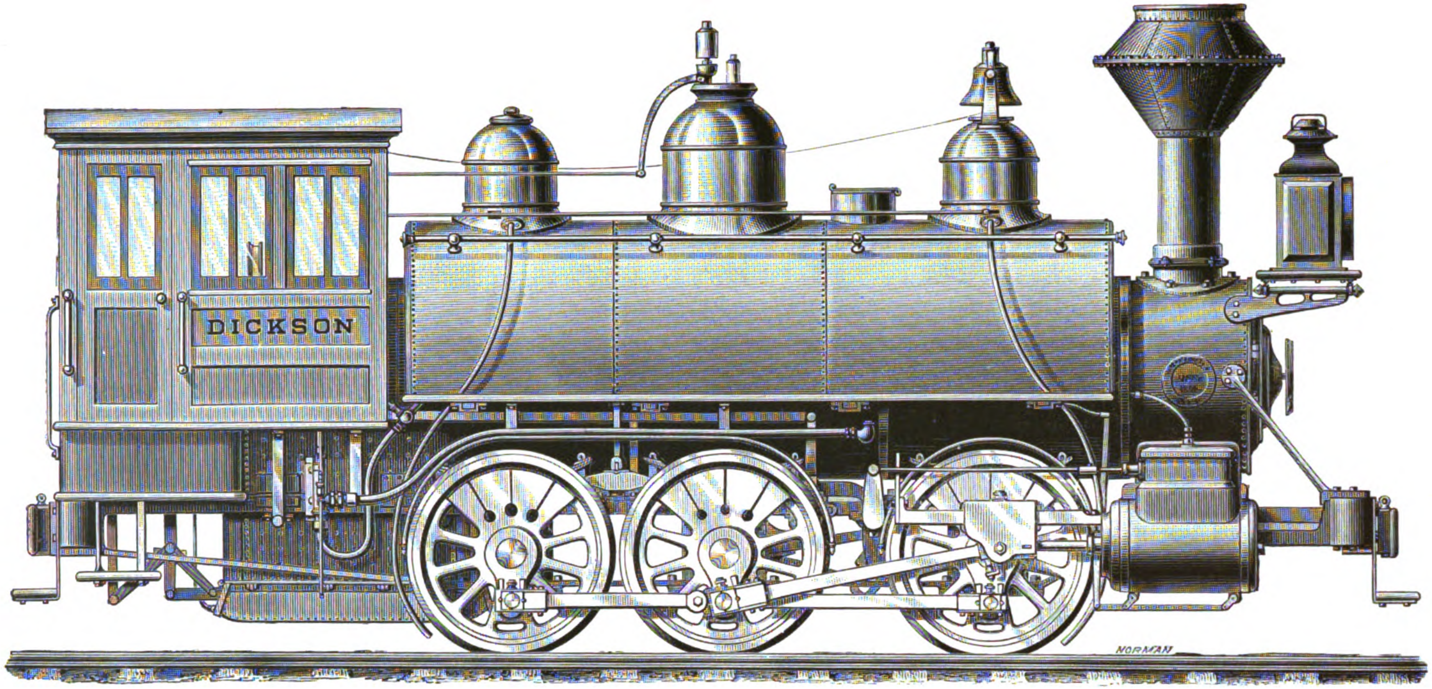
The design differs from the preceding only in those respects which are due to the nature of the fuel for which it is intended, and the general remarks on page 44 apply equally well to the present case.

The fire box of this locomotive is between the driving wheel axles, and necessitates, for the larger sizes of engines, a greater spread of wheels than in the other, as in the latter case the fire box is above the rear axle.

The general specifications are given on page 45.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS D.

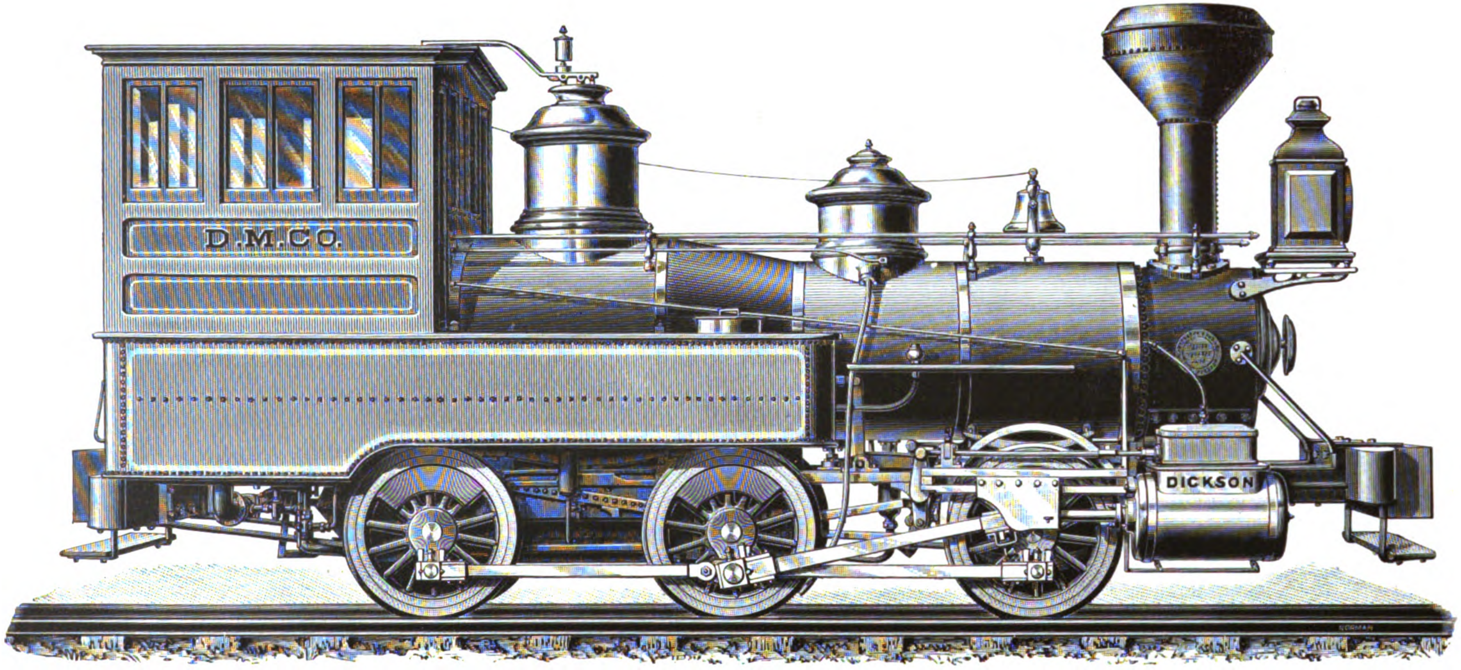


GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS D.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—D	15—D	16—D	17—D	18—D	19—D		
Cylinders, Diameter	14"	15"	16"	17"	18'	19"		
" Stroke	22"	22"	22" or 24"	22" or 24"	22" or 24"	22" or 24"		
Diameter of Driving Wheels	42' to 50"	42" to 50"	42" to 50"	42" to 50"	42" to 50"	42' to 50"		
Wheel Base, Rigid	9' 9"	10 ft.	10 ft.	10' 8"	10' 6"	10' 9"		
Length of Engine	27' 7"	28' 1½"	28' 9"	29' 5"	30' 1"	30' 8"		
Weight Loaded, Total	67,000 lbs.	73,000 lbs.	79,000 lbs.	85,000 lbs.	91,000 lbs.	97,000 lbs.		
Capacity of Tank	700 gal.	750 gal.	850 gal.	900 gal.	950 gal.	1,000 gal.		
Hauling Capacity on Level	1,600 tons.	1,750 tons.	1,900 tons.	2,025 tons.	2,175 tons.	2,325 tons.		
" " 20 ft. Grade	775 "	850 "	920 "	980 "	1,055 "	1,125 "		
" " 40 ft. "	520 "	570 "	615 "	655 "	705 "	755 "		
" " 60 ft. "	385 "	420 "	455 "	485 "	525 "	560 "		
" " 80 ft. "	305 "	335 "	365 "	385 "	415 "	445 "		
" " 100 ft. "	255 "	280 "	300 "	320 "	345 "	370 "		
Price ready for service at works in Scranton	$	$	$	$	$	$		

SIX-WHEEL TANK SWITCHING ENGINE.

CLASS D.

We devote the three preceding pages to views and particulars of the Six-Wheel Tank Switching Engine, which is designed for switching service in yards and depots of stations, and can also be used for short runs on local roads.

These engines are built with the tank placed either on the top or sides of the boiler, thereby utilizing all the weight for adhesion, which is equally distributed among the wheels. There is an equalizing lever between the middle and back driving wheels on each side, and the front driving wheels are equalized transversely, thus giving the engine an easy and steady motion.

General specifications will be found on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; tubes of best charcoal iron set with copper ferrules in both tube sheets; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but can make the middle pair of wheels with plain tires if required.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted either on top or sides of boiler.

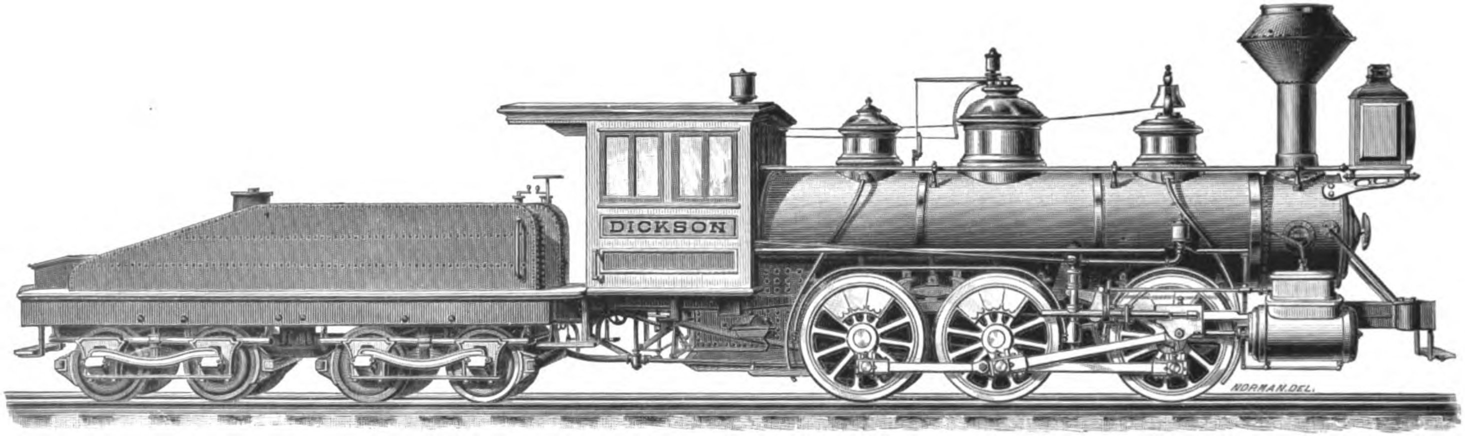
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE,

WITH TENDER. CLASS D.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS SWITCHING ENGINE—WITH TENDER.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—D	15—D	16—D	17—D	18—D	19—D		
Cylinders, Diameter	14″	15″	16″	17″	18″	19″		
" Stroke	22″	22″	22″ or 24″	22″ or 24″	22″ or 24″	22″ or 24″		
Diameter of Driving Wheels	42″ to 50″	42″ to 50″	42″ to 50″	42″ to 50″	42″ to 50″	42″ to 50″		
Wheel Base, Rigid	9′ 9″	10 ft.	10 ft.	10′ 3″	10′ 6″	10′ 9″		
" " Engine and Tender	37′ 9″	38′ 1½″	39′ 1½″	39′ 9″	40′ 7″	41′ 2″		
Length of " " "	45′ 3″	46′ 1½″	46′ 7½″	47′ 8″	48′ 1″	48′ 8″		
Weight Loaded, Total	55,000 lbs.	60,000 lbs.	65,000 lbs.	70,000 lbs.	75,000 lbs.	80,000 lbs.		
Capacity of Tank	1,500 gal.	1,600 gal.	1,800 gal.	2,000 gal.	2,200 gal.	2,400 gal.		
Hauling Capacity on Level	1,360 tons.	1,480 tons.	1,605 tons.	1,730 tons.	1,850 tons.	1,975 tons.		
" " 20 ft. Grade	650 "	705 "	765 "	830 "	885 "	945 "		
" " 40 ft. "	430 "	465 "	505 "	550 "	605 "	625 "		
" " 60 ft. "	315 "	340 "	370 "	400 "	425 "	455 "		
" " 80 ft. "	250 "	265 "	290 "	315 "	335 "	360 "		
" " 100 ft. "	205 "	220 "	240 "	260 "	275 "	295 "		
Price ready for service at works in Scranton	$	$	$	$	$	$		

SIX-WHEEL SWITCHING LOCOMOTIVE.

CLASS D.

WITH TENDER.

On the two preceding pages we illustrate and present the principal particulars of the Six-Wheel Switching Locomotive, with tender, which is designed for switching service in yards and stations, and for short runs on local roads.

The weight of the engine is equally distributed among the six wheels, thus utilizing all the weight for adhesion, and there is an equalizing lever between the middle and back driving wheels on each side. There is also a transverse equalizing lever connecting the front ends of the forward springs.

The tender has either a straight or sloping top, and is provided with six wheels, or two four-wheeled trucks.

General specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; tubes of best charcoal iron set with copper ferrules in both tube sheets; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but can make the middle pair of wheels with plain tires if required.

CAB—Of hard wood with plate-glass windows.

TANK—Of ample capacity, made straight on top with flanges on sides and back, or made sloping on back to give the engineer a clear view in the rear. Mounted on either an oak or an iron frame, with six wheels or two four-wheel trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

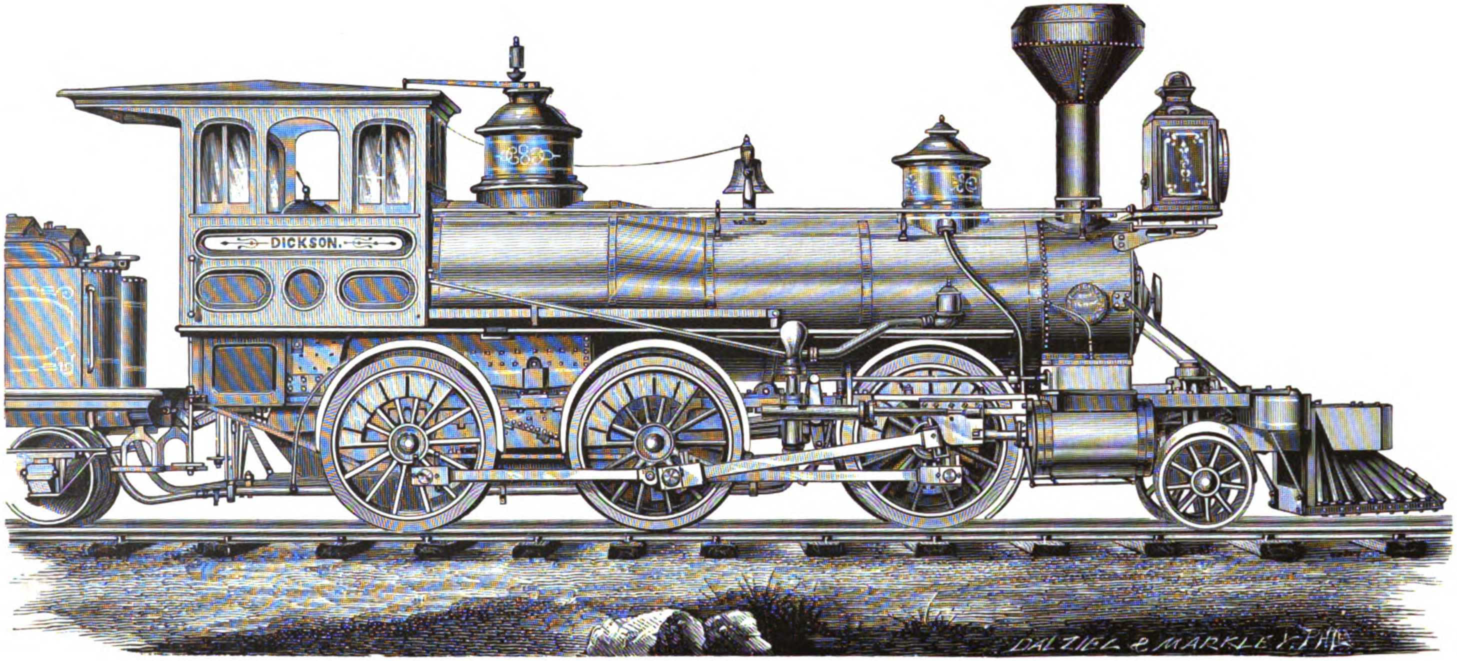
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

CLASS E.



GAUGE, 4 FEET 8½ INCHES.

FUEL, ANTHRACITE COAL.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

FUEL, ANTHRACITE COAL.
GAUGE, 4 FEET 8½ INCHES.

DIMENSIONS AND CAPACITIES OF NINE SIZES OF THIS CLASS.

CLASS	**12-E**	**13-E**	**14-E**	**15-E**	**16-E**	**17-E**	**18-E**	**19-E**	**20-E**
Cylinders, Diameter	12″	13″	14″	15″	16″	17″	18″	19″	20″
" Stroke	18″ to 20″	18″ to 20″	20″ to 22″	20″ to 22″	22″ to 24″	22″ to 24″	22″ to 24″	22″ to 24″	22″ to 24″
Diameter of Driving Wheel	36″ to 42″	36″ to 42″	36″ to 42″	40″ to 44″	44″ to 48″	48″ to 56″	48″ to 56″	54″ to 60″	54″ to 60″
" " Truck Wheel	24″	24″	26″	26″	28″	28″ to 30″	30″	30″	30″
Wheel Base Rigid	9′-6″	10′-0″	10′-6″	11′-0″	12′-0″	13′-0″	14′-2″	14′-6″	15′-0″
" " Total	16′-0″	16′-6″	17′-4″	18′-2″	19′-4″	20′-6″	21′-8″	22′-0″	22′-6″
" " Engine and Tender	37′-6″	38′-0″	39′-6″	40′-0″	43′-0″	44′-4″	45′-5″	46′-5″	47′-5″
Length of Engine and Tender	46′-4″	46′-10′	49′-2″	49′-8″	52′-10″	54′-0″	55′-4″	56′-4″	57′-4″
Weight Loaded, Total	48,000 lbs.	53,000 lbs.	58,000 lbs.	64,000 lbs.	70,000 lbs.	77,000 lbs.	83,000 lbs.	90,000 lbs.	98,000 lbs.
" " on Drivers	40,000 lbs.	44,000 lbs.	48,000 lbs.	54,000 lbs.	59,000 lbs.	66,000 lbs.	71,000 lbs.	77,000 lbs.	85,000 lbs.
" " " Truck	8,000 lbs.	9,000 lbs.	10,000 lbs.	10,000 lbs.	11,000 lbs.	11,000 lbs.	12,000 lbs.	13,000 lbs.	13,000 lbs.
Capacity of Tank	1,400 gal.	1,500 gal.	1,800 gal.	2,000 gal.	2,000 gal.	2,400 gal.	2,600 gal.	2,800 gal.	3,000 gal.
Hauling Capacity on Level	985 tons.	1,085 tons.	1,180 tons.	1,325 tons.	1,450 tons.	1,625 tons.	1,750 tons.	1,895 tons.	2,095 tons.
" " 20 ft. Grade	470 "	520 "	560 "	630 "	690 "	775 "	835 "	900 "	1,000 "
" " 40 ft. "	310 "	340 "	370 "	410 "	455 "	510 "	550 "	595 "	660 "
" " 60 ft. "	225 "	250 "	270 "	300 "	330 "	370 "	400 "	435 "	480 "
" " 80 ft. "	175 "	195 "	210 "	230 "	255 "	290 "	315 "	340 "	375 "
" " 100 ft. "	145 "	160 "	170 "	190 "	210 "	235 "	255 "	275 "	305 "
Price ready for service on car at Scranton	$	$	$	$	$	$	$	$	$

"MOGUL" LOCOMOTIVE.

CLASS E.

FOR ANTHRACITE COAL.

On the two preceding pages we give an illustration and table of principal particulars of the locomotive known as the "Mogul" (so called because the first one of its type was named "Mogul"), as built by us for burning anthracite coal.

Of late years this style of engine has come into use for heavy freight service, and weighs considerably more than the "American" type. The greater portion of its weight is carried on driving wheels, and as there are six of them, among which the weight is equally distributed, the pressure of each wheel on the rail is kept within a safe limit. The pilot truck is provided with a swing bolster and radius bar, which allows the engine to "take" curves with ease and safety even at high speeds, as is proved by their successful use for express passenger service in some instances. The weight on the truck is only sufficient to keep the engine securely on the track, and to gradually bring the rails down to the level to which they will be brought by the greater weight on the driving wheels. This is a matter of considerable importance, and is often overlooked. We build these engines with flanges on all the wheels, some of which have had fifteen feet of rigid wheel base, and after a year's service on a line having curves of ten degrees, show no appreciable signs of wear on flanges.

"Mogul" Engines for anthracite coal have the driving wheels equally spaced from each other, and in the larger sizes the fire box is placed above the frames, in order to have as large a grate area as possible without making the length of the fire box excessive.

We have made the building of the "Mogul" engine almost a specialty at our works, and recommend it as an economical type of engine for heavy service, and one which will do twenty-five per cent. more work than the "American" type for the same number of engine and train men.

On the following page are given general specifications of "Mogul" Engines, as we build them without special instructions.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

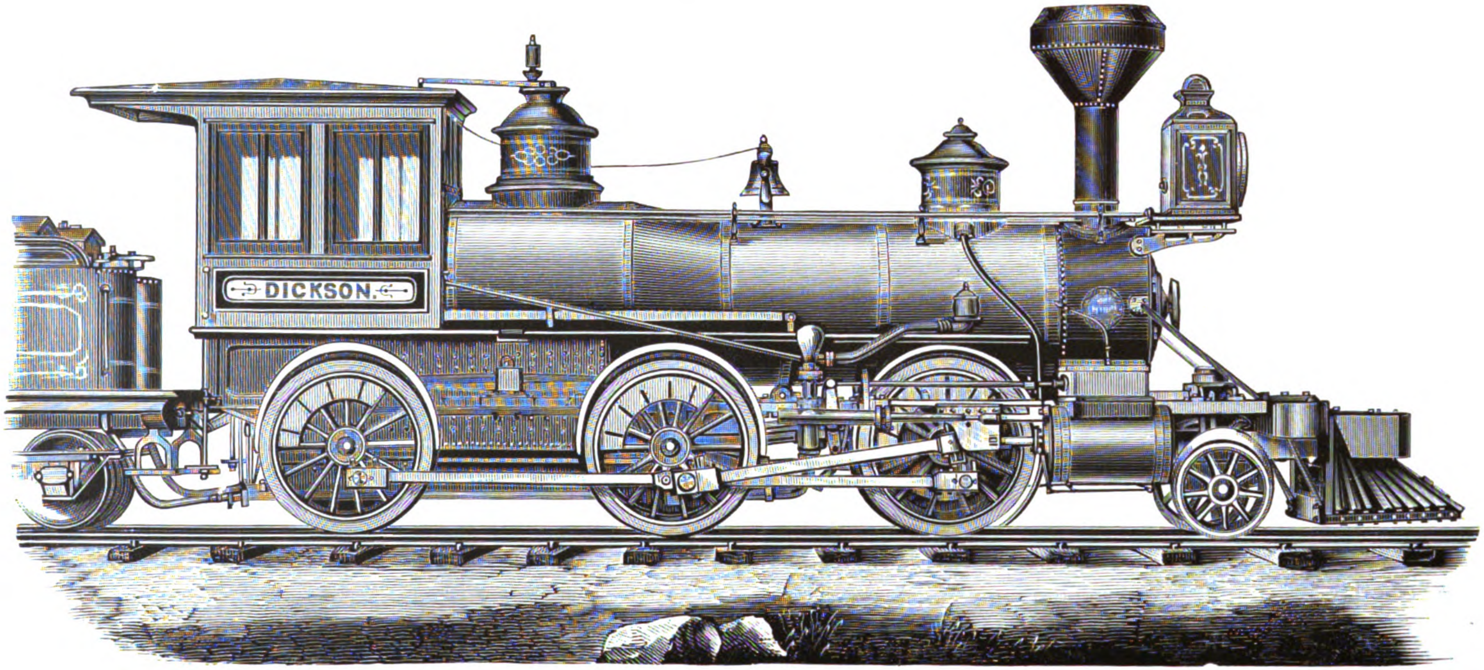
TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

CLASS E.



GAUGE, 4 FEET 8½ INCHES.

FUEL, BITUMINOUS COAL, OR WOOD.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

FUEL, BITUMINOUS COAL, OR WOOD.
GAUGE, 4 FEET 8½ INCHES.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	12-E	13-E	14-E	15-E	16-E	17-E	18-E	19-E
Cylinders, Diameter	12"	13"	14"	15"	16"	17"	18"	19"
" Stroke	18" to 20"	18" to 20"	20" to 22"	20" to 22"	22" to 24"	22" to 24"	22" to 24"	22" to 24"
Diameter of Driving Wheel	36" to 42"	36" to 42"	36" to 42"	40" to 44"	44" to 48"	48" to 56"	54" to 60"	54" to 60"
" " Truck Wheel	24"	24"	26"	26"	28"	28" to 30"	30"	30"
Wheel Base Rigid	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	14'-6"	15'-0"	15'-2"
" " Total	18'-6"	19'-0"	19'-10"	20'-8"	21'-4"	22'-0"	22'-6"	22'-10"
" " Engine and Tender	37'-8"	38'-4"	39'-5"	40'-3"	40'-11'	41'-7"	43'-1"	43'-5"
Length of Engine and Tender	46'-8"	47'-2"	48'-9"	49'-11"	50'-7"	51'-6"	53'-0"	53'-4"
Weight Loaded, Total	47,000 lbs.	52,000 lbs.	57,000 lbs.	62,000 lbs.	68,000 lbs.	75,000 lbs.	80,000 lbs.	86,000 lbs.
" " on Drivers	39,000 lbs.	43,000 lbs.	47,000 lbs.	52,000 lbs.	57,000 lbs.	64,000 lbs.	68,000 lbs.	73,000 lbs.
" " " Truck	8,000 lbs.	9,000 lbs.	10,000 lbs.	10,000 lbs.	11,000 lbs.	11,000 lbs.	12,000 lbs.	12,000 lbs.
Capacity of Tank	1,400 gal.	1,500 gal.	1,800 gal.	2,000 gal.	2,000 gal.	2,400 gal.	2,600 gal.	2,800 gal.
Hauling Capacity on Level	960 tons.	1,060 tons.	1,155 tons.	1,275 tons.	1,400 tons.	1,575 tons.	1,675 tons.	1,795 tons.
" " 20 ft. Grade	460 "	505 "	550 "	605 "	665 "	750 "	795 "	855 "
" " 40 ft. "	300 "	335 "	360 "	395 "	435 "	495 "	525 "	561 "
" " 60 ft. "	220 "	245 "	260 "	285 "	315 "	360 "	385 "	410 "
" " 80 ft. "	170 "	190 "	205 "	225 "	245 "	280 "	300 "	320 "
" " 100 ft. "	140 "	155 "	165 "	180 "	200 "	230 "	245 "	260 "
Price ready for service on car at Scranton	$	$	$	$	$	$	$	$

"MOGUL" LOCOMOTIVE.

CLASS E.

FOR BITUMINOUS COAL, OR WOOD.

The two preceding pages we devote to a representation and table of principal dimensions and hauling capacities of a number of sizes of this engine as built by us for burning bituminous coal, or wood.

The remarks on page 60 apply to this locomotive, except those which refer to the peculiarities of construction of the fire box and the spacing of the driving wheels. In the bituminous coal burning "Mogul" the fire box is placed between the two back pairs of driving-wheel axles, which causes their unequal spacing.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

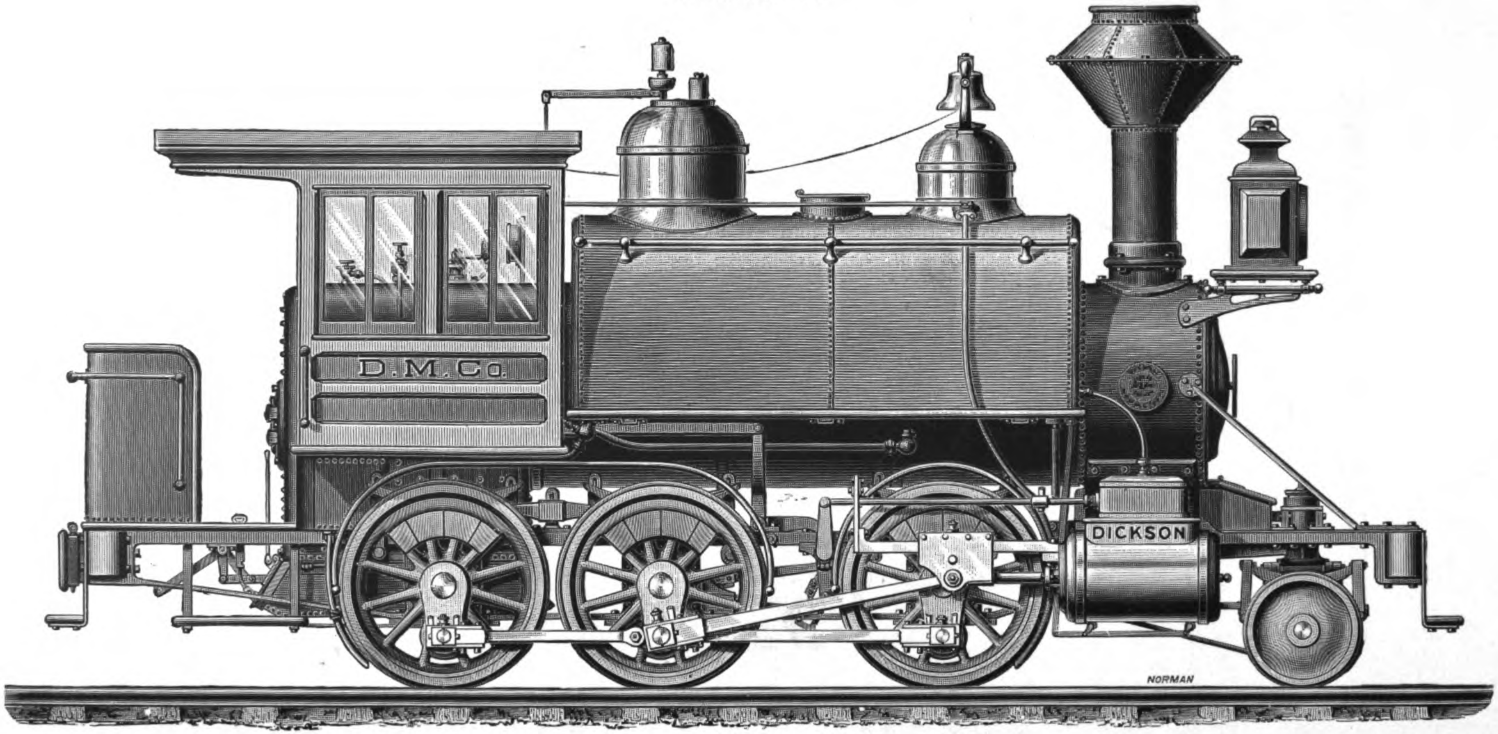
TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE.

CLASS E.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—E	15—E	16—E	17—E	18—E	19—E		
Cylinders, Diameter	14″	15″	16″	17″	18″	19″		
" Stroke	22″	22″	22 or 24″	22″ or 24″	22″ or 24″	22″ or 24″		
Diameter of Driving Wheels	40″ to 50″	42″ to 54″	42″ to 54″	42″ to 54″	44″ to 56″	44″ to 56″		
" Truck Wheels	25″ to 30″	26″ to 30″	26″ to 30″	26″ to 30″	28″ to 30″	28″ to 30″		
Wheel Base, Rigid	9′ 9″	10′ 0″	10′ 0″	10′ 3″	10′ 6″	10′ 9″		
" " Total	16′ 10″	17′ 3″	17′ 6″	17′ 10″	18′ 4″	18′ 10″		
Length of Engine without Pilot	28′ 0″	28′ 9″	29′ 6″	30′ 0″	31′ 0″	32′ 0″		
" " with one Pilot	31′ 0″	32′ 0″	32′ 9″	33′ 6″	34′ 6″	35′ 6″		
Weight, Loaded, Total	68,000 lbs.	74,000 lbs.	80,000 lbs.	86,000 lbs.	92,000 lbs.	98,000 lbs.		
" " on Drivers	56,000 "	62,000 "	67,000 "	73,000 "	78,000 "	84,000 "		
" " on Trucks	12,000 "	12,000 "	13,000 "	13,000 "	14,000 "	14,000 "		
Capacity of Tank	700 gal.	750 gal.	850 gal.	900 gal.	950 gal.	1,000 gal.		
Hauling Capacity on Level	1,300 tons.	1,425 tons.	1,575 tons.	1,700 tons.	1,825 tons.	1,950 tons.		
" " 20 ft. Grade	625 "	685 "	760 "	820 "	830 "	940 "		
" " 40 ft. "	420 "	460 "	510 "	550 "	590 "	630 "		
" " 60 ft. "	310 "	340 "	375 "	405 "	480 "	465 "		
" " 80 ft. "	245 "	270 "	305 "	320 "	345 "	370 "		
" " 100 ft. "	206 "	225 "	245 "	265 "	285 "	305 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED TANK LOCOMOTIVE.

CLASS E.

On the preceding page we present the general dimensions, weights and hauling capacities of several sizes of the six-coupled "Tank Switching" Locomotive, pony truck. This is designed for switching service, or for very short runs in the suburban service of cities or for logging service. It is also well adapted to elevated railroads, as it runs steadily and passes with case around curves of short radius.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted in the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar, equalized with driving wheels; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

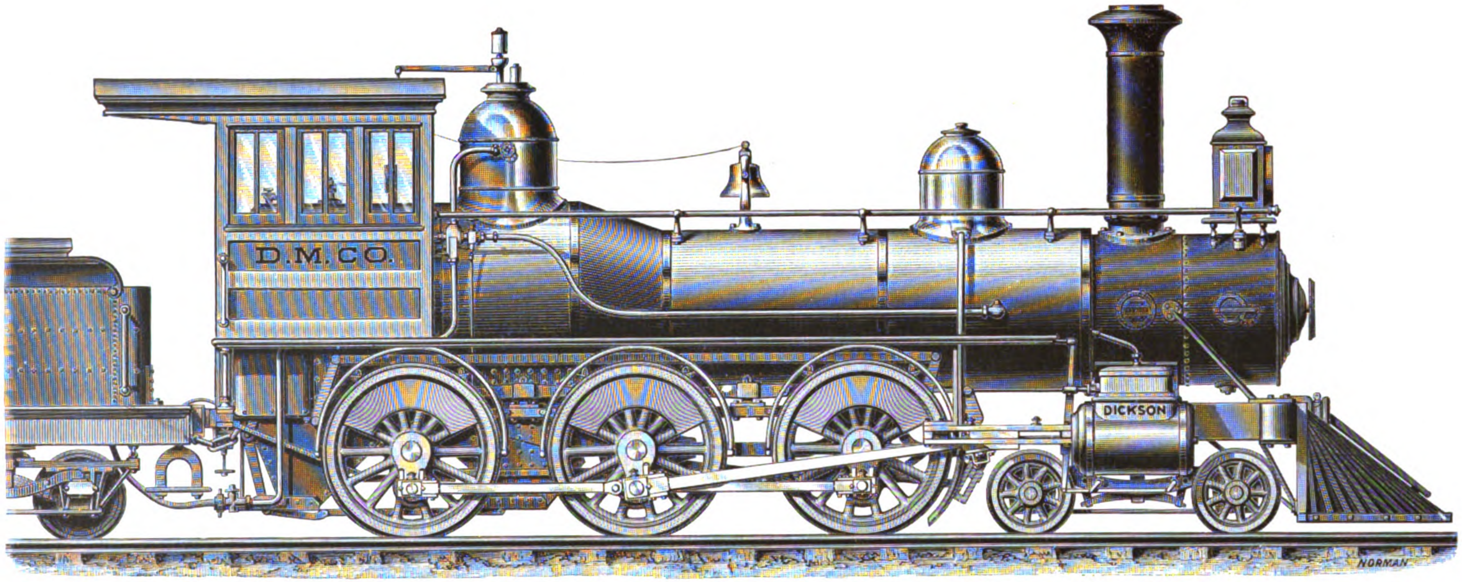
TANK.—Mounted on top of boiler.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

"TEN-WHEEL" FREIGHT LOCOMOTIVE.

CLASS F.



GAUGE, 4 FEET 8½ INCHES.

FUEL, ANTHRACITE COAL.

"TEN-WHEEL" FREIGHT LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, ANTHRACITE COAL.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	15—F	16—F	17—F	18—F	19—F	20—F		
Cylinders, Diameter	15"	16"	17"	18"	19"	20"		
" Stroke	20" to 22"	22" to 24"	22" to 24"	22" to 24"	22" to 24"	22" to 24"		
Diameter of Driving Wheels	40" to 44"	44" to 48"	48" to 56"	48" to 56"	54" to 60"	54" to 60"		
" Truck "	22" to 24"	24" to 26"	26" to 28"	26" to 28"	28" to 30"	28" to 30"		
Wheel Base, Rigid	9' 6"	10' 0"	11' 0"	12' 0"	13' 0"	13' 0"		
" " Total	19' 0"	19' 10"	21' 1"	22' 1"	23' 3"	23' 3"		
" " Engine and Tender	40' 4"	41' 2"	43' 4"	45' 2"	47' 7"	47' 7"		
Length of " " "	49' 0"	50' 0"	52' 2"	55' 0"	56' 5"	56' 5"		
Weight Loaded, Total	66,000 lbs.	73,000 lbs.	79,000 lbs.	85,000 lbs.	92,000 lbs.	100,000 lbs.		
" " on Drivers	50,000 "	55,000 "	60,000 "	65,000 "	71,000 "	78,000 "		
" " on Truck	16,000 "	18,000 "	19,000 "	20,000 "	21,000 "	22,000 "		
Capacity of Tank	2,000 gal.	2,200 gal.	2,400 gal.	2,600 gal.	2,800 gal.	3,000 gal.		
Hauling Capacity on Level	1,230 tons.	1,325 tons.	1,475 tons.	1,600 tons.	1,750 tons.	1,920 tons.		
" " 20 ft. Grade	585 "	630 "	705 "	760 "	835 "	915 "		
" " 40 ft. "	385 "	410 "	460 "	500 "	550 "	605 "		
" " 60 ft. "	280 "	300 "	335 "	365 "	400 "	440 "		
" " 80 ft. "	220 "	230 "	260 "	285 "	315 "	345 "		
" " 100 ft. "	180 "	190 "	210 "	230 "	255 "	280 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

TEN-WHEEL LOCOMOTIVE.

CLASS F.

FOR ANTHRACITE COAL.

On the two preceding pages we present the general dimensions, weights and hauling capacities of several of the more common sizes of the so-called Ten-Wheel Freight Locomotive, which is extensively used on American railroads, and will do twenty per cent. more work with the same number of engine and train men than the "American" type.

The driving wheels of the Ten-Wheel Locomotive are so placed as to utilize most of the weight for adhesion, and as it is equally distributed among them, it is not so severe on the track as the "American" type of the same weight, although the latter is generally much lighter than the former. On the larger sizes of this engine, when built for burning anthracite coal, the fire box is placed above the frames, by means of which construction it can be made eight or nine inches wider than when placed between them. The grate area is thus increased some twenty-five per cent., and the steaming capacity of the engine thereby benefited. The truck has four wheels, and is made either with or without a swing bolster.

The general specifications, as we usually build this engine, follow.

GENERAL SPECIFICATIONS.

BOILER.—Wagon top plain with one dome, or made straight on top with one dome in center, or two domes, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors if required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but will make either the middle pair or the front pair with plain tires if required. If the front pair of driving wheels are made with plain tires we would recommend a truck with center bearings

ENGINE TRUCK.—Center bearing or swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

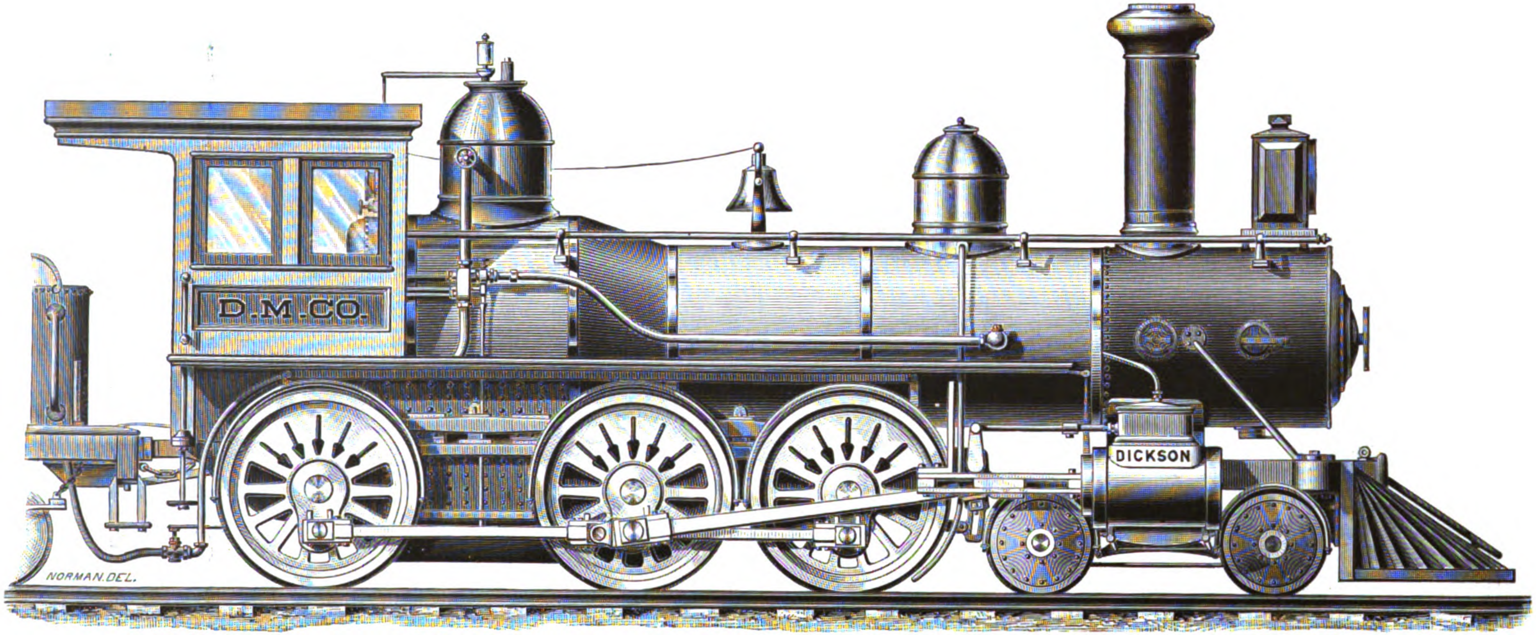
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit purchaser.

"TEN-WHEEL" FREIGHT LOCOMOTIVE.

CLASS F.


D.M.CO.
DICKSON
NORMAN DEL.

GAUGE, 4 FEET 8½ INCHES.

FUEL, BITUMINOUS COAL, OR WOOD.

"TEN-WHEEL" FREIGHT LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES, FUEL, BITUMINOUS COAL, OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	15—F	16—F	17—F	18—F	19—F				
Cylinders, Diameter	15″	16″	17″	18″	19″				
" Stroke	22″ to 24″	22″ to 24″	22″ to 24″	22″ to 24″	22″ to 24″				
Diameter of Driving Wheels	40″ to 4′4′	44″ to 48″	48″ to 56″	48″ to 56″	54″ to 60″				
" Truck Wheels	22″ to 24″	24″ to 26″	26″ to 28″	26″ to 28″	28″ to 30″				
Wheel Base, Rigid	11′ 9″	12′ 4″	12′ 11″	13′ 2″	13′ 10″				
" " Total	21′ 3″	22′ 2″	23′ 0″	23′ ″3	24′ 1″				
" " Engine and Tender	40′ 10″	41′ 9″	42′ 7′	43′ 10″	44′ 8″				
Length of Engine and Tender	49′ 6″	50′ 7′	51′ 5″	52′ 8″	53′ 6″				
Weight, Loaded, Total	64,000 lbs.	70,000 lbs.	76,000 lbs.	82,000 lbs.	88,000 lbs.				
" " on Drivers	47,000 "	51,000 "	56,000 "	61,000 "	66,000 "				
" " on Truck	17,000 "	19,000 "	20,000 "	21,000 "	22,000 "				
Capacity of Tank	2,000 gal.	2,200 gal.	2,400 gal.	2,600 gal.	2,800 gal.				
Hauling Capacity on Level	1,155 tons.	1,250 tons.	1,375 tons.	1,500 tons.	1,625 tons.				
" " 20 ft. Grade	550 "	590 "	655 "	715 "	775 "				
" " 40 ft. "	360 "	390 "	430 "	470 "	510 "				
" " 60 ft. "	260 "	280 "	310 "	340 "	370 "				
" " 80 ft. "	205 "	215 "	240 "	265 "	290 "				
" " 100 ft. "	165 "	175 "	195 "	215 "	235 "				
Prices ready for service at works in Scranton	$	$	$	$	$				

TEN-WHEEL LOCOMOTIVE.

CLASS F.

FOR BITUMINOUS COAL, OR WOOD.

On the two preceding pages we give particulars of our Ten-Wheel Locomotives, as we build them for burning bituminous coal, or wood.

The description of the same class of engine given on page 72 applies here, except that in the case of the bituminous coal burning engine, the fire box is always between the frames and between the two back driving-wheel axles, causing the unequal spacing of the wheels.

Specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Wagon top plain with one dome, or made straight on top with one dome in center, or two domes, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve; one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors if required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but will make either the middle pair or the front pair with plain tires if required. If the front pair of driving wheels are made with plain tires we would recommend a truck with center bearings.

ENGINE TRUCK.—Center bearing or swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

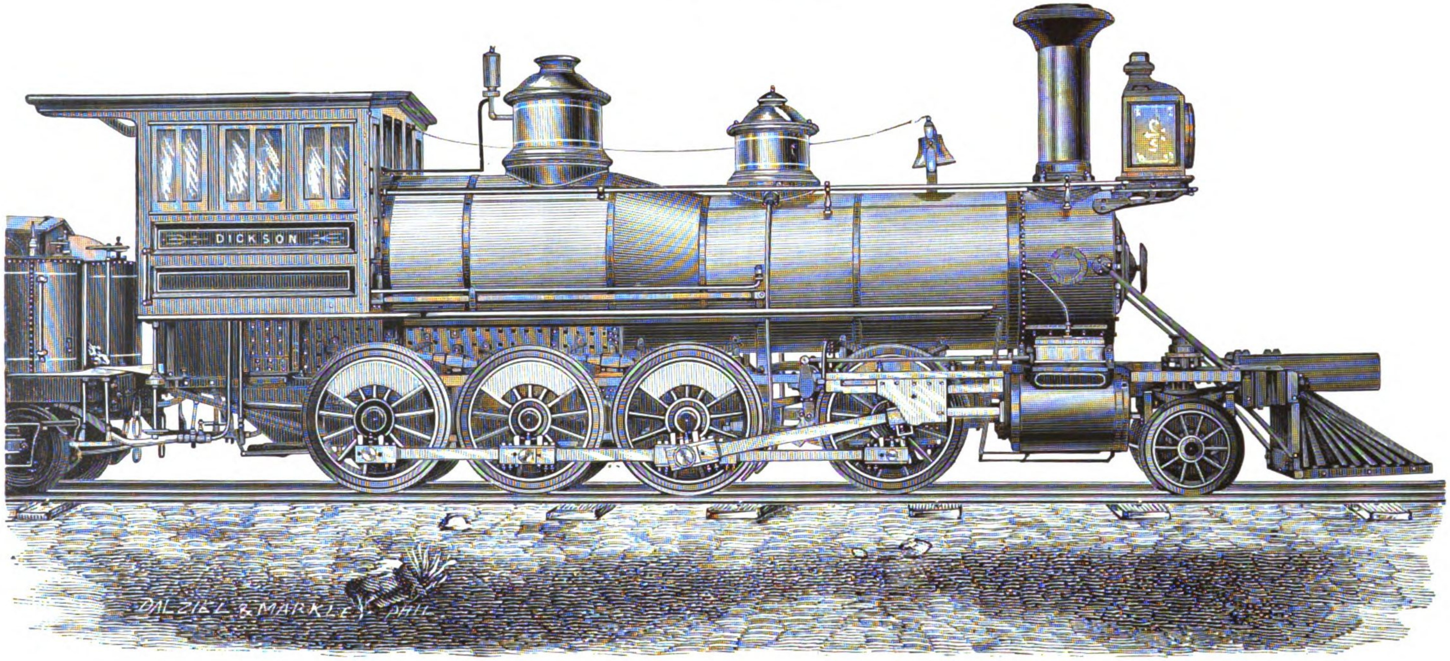
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

"CONSOLIDATION" LOCOMOTIVE.

CLASS H.



GAUGE, 4 FEET 8½ INCHES.

FUEL, ANTHRACITE OR BITUMINOUS COAL, OR WOOD.

"CONSOLIDATION" LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, ANTHRACITE OR BITUMINOUS COAL, OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS....................................	18—H	19—H	20—H	21—H	22—H				
Cylinders, Diameter.............	18'	19"	20"	21"	22"				
" Stroke..................................	24"	24"	24"	24" to 26"	24" to 26"				
Diameter of Driving Wheels.................. ...	50"	50"	50"	50"	50'				
" Truck Wheels........................	30"	30"	30"	30"	30"				
Wheel Base, Rigid..............................	14' 9"	14' 9"	15' 0"	15' 0"	15' 0"				
" " Total	22' 10"	22' 10'	23' 1"	23' 1"	23' 1"				
" " Engine and Tender..................	45' 7'	46' 1"	46' 7"	46' 7'	47' 10"				
Length of Engine and Tender.....	53' 9'	55' 3'	56' 3"	56' 3"	57' 6"				
Weight, Loaded, Total...........................	88,000 lbs.	95,000 lbs.	108,000 lbs.	114,000 lbs.	125,000 lbs.				
" " on Drivers.....	76,000 "	82,000 "	90,000 "	100,000 "	110,000 "				
" " on Truck.......................	12.000 "	13,000 "	13,000 "	14.000 "	15,000 "				
Capacity of Tank..................................	2,400 gal.	2,600 gal.	2,800 gal.	3,000 gal.	3,000 gal.				
Hauling Capacity on Level.........................	1,875 tons.	2,025 tons.	2,225 tons.	2,470 tons.	2 720 tons.				
" " 20 ft. Grade......................	895 "	965 "	1,060 "	1,180 "	1,300 "				
" " 40 ft. "	590 "	640 "	700 "	780 "	860 "				
" " 60 ft. "	430 "	465 "	510 "	570 "	630 "				
" " 80 ft. "	338 "	365 "	400 "	450 "	495 "				
" " 100 ft. "	275 "	300 "	330 "	370 "	405 "				
Prices ready for service at works in Scranton	$	$	$	$	$				

CONSOLIDATION LOCOMOTIVE.

CLASS H.

On the two preceding pages we give the leading particulars of the "Consolidation" Locomotive (which received its name from that of the first one built), which is now in common use for very heavy freight service, and as helpers or pushers on heavy grades. It is the heaviest type commonly built, is the most economical for the service for which it is designed, and will do from forty to fifty per cent. more work with the same number of engine and train men than the "American" type.

There are eight coupled wheels, and a two-wheeled pilot truck in front with a swinging bolster or center, and a radius bar of the proper length to allow the engine to pass easily around curves. We have built such engines having fifteen feet of rigid wheel base with flanges on all the wheels, which after a year's service on a line having curves of ten degrees, show no appreciable signs of wear on the flanges. On the larger sizes we make the boiler with the fire box on top of the frames, in order to gain eight or nine inches in width, and thus increase the grate area some twenty-five per cent. which is essential for free steaming. The boilers are made either straight or wagon top, with or without the extended smoke box, and with a grate either for anthracite or bituminous coal.

On the following page are given general specifications as we generally build these locomotives.

GENERAL SPECIFICATIONS.

BOILER.—Wagon top plain with one dome, or made straight on top with one dome in center, or two domes, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams double riveted. Fire box of steel, of ample size for generating steam (see preceding page for fire box); tubes of best charcoal iron set with copper ferrules in both tube heads; steam dome fitted with balanced throttle valve; one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors if required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of wrought iron or cast steel.

GUIDE BARS—Of steel, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but will make the first and third pairs or the second and third pairs of wheels with plain tires if required (see preceding page for flanged tires and wheel base).

ENGINE TRUCK.—Swing bolster, with radius bar; hammered iron axles; cast-iron axle boxes with cast brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

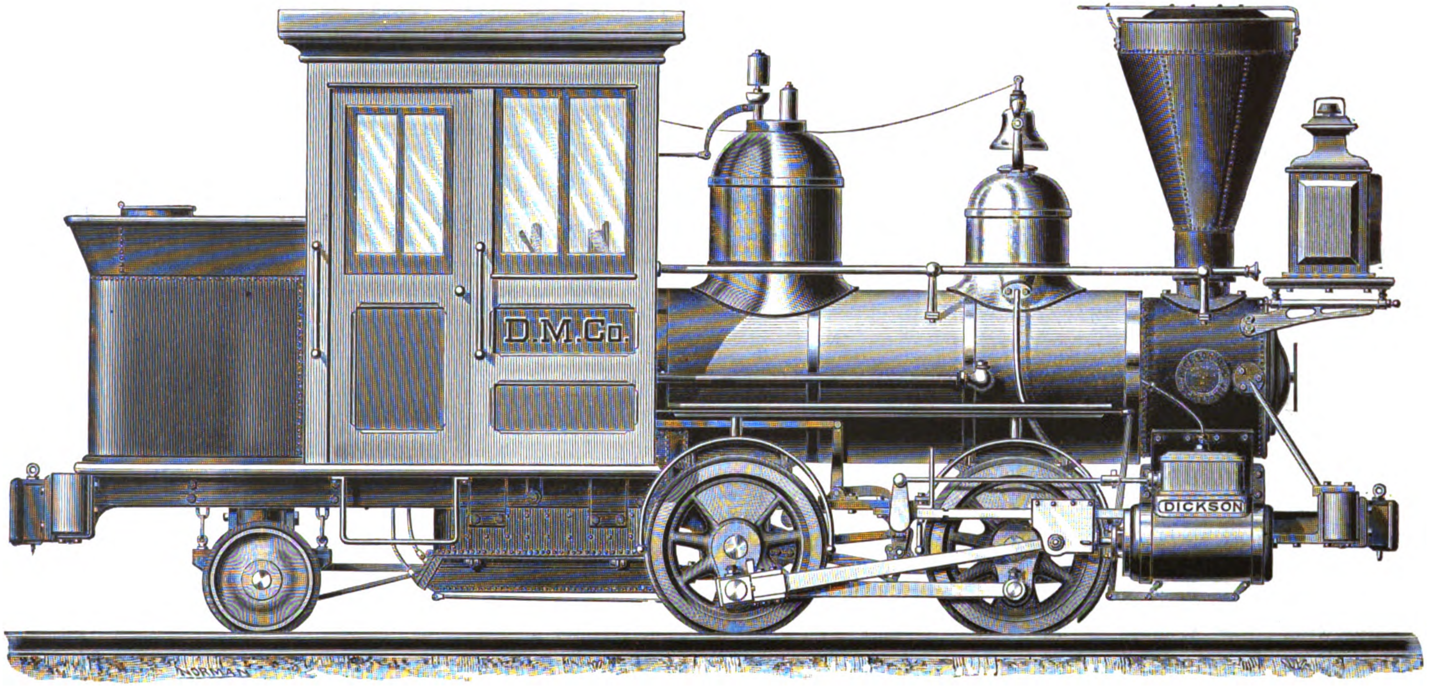
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

SWITCHING ENGINE—WITH TANK.

CLASS I.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SWITCHING ENGINE—WITH TANK.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	10—I	11—I	12—I	13—I	14—I	15—I	16—I	17—I
Cylinders, Diameter	10″	11″	12″	13″	14″	15″	16″	17″
" Stroke	16″	16″	18″	20″	22″	22″	22″ or 24″	22″ or 24″
Diameter of Driving Wheels	33″ to 40″	36″ to 42″	36″ to 45″	36″ to 48″	40″ to 50″	42″ to 54″	42″ to 54″	44″ to 56″
" Truck Wheels	22″ to 24″	24″ to 26″	24″ to 26″	24″ to 28″	26″ to 30″	26″ to 30″	26″ to 30″	28″ to 30″
Wheel Base, Rigid	5′ 3″	5′ 6″	5′ 9″	6′ 0″	6′ 6″	7′ 0″	7′ 6″	7′ 6″
" " Total	12′ 0″	12′ 9″	13′ 6″	14′ 3″	15′ 3″	16′ 0″	17′ 0″	17′ 6″
Length of Engine without Pilot	22′ 6″	23′ 6″	24′ 9″	26′ 3″	27′ 6″	28′ 6″	29′ 9″	30′ 3″
" " with one Pilot	25′ 2″	26′ 6″	27′ 9″	29′ 6″	30′ 9″	31′ 9″	33′ 0″	33′ 6″
Weight, Loaded, Total	34,000 lbs.	40,000 lbs.	46,000 lbs.	52,000 lbs.	58,000 lbs.	64,000 lbs.	70,000 lbs.	76,000 lbs.
" " on Drivers	26,000 "	31,000 "	36,000 "	42,000 "	47,000 "	53,000 "	58,000 "	64,000 "
" " on Truck	8,000 "	9,000 "	10,000 "	10,000 "	11,000 "	11,000 "	12,000 "	12,000 "
Capacity of Tank	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.	750 gal.	850 gal.	950 gal.
Hauling Capacity on Level	600 tons.	725 tons.	850 tons.	975 tons.	1,100 tons.	1,250 tons.	1,400 tons.	1,550 tons.
" " 20 ft. Grade	290 "	350 "	410 "	460 "	530 "	605 "	680 "	750 "
" " 40 ft. "	195 "	235 "	275 "	315 "	355 "	405 "	455 "	500 "
" " 60 ft. "	145 "	175 "	205 "	235 "	265 "	300 "	335 "	370 "
" " 80 ft. "	115 "	140 "	160 "	185 "	210 "	240 "	265 "	295 "
" " 100 ft. "	95 "	115 "	135 "	160 "	175 "	200 "	220 "	245 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

TANK SWITCHING ENGINE.

CLASS I.

The Class "I" Tank Switching Locomotive, of which we present particulars, is made with the tank as shown on the engraving, or on top of the boiler, and is designed for switching, or for logging or plantation service. The rear truck, which is used whether the tank is on the boiler or not, is of the swing-bolster, radius-bar kind, and has a general steadying effect upon the engine when in motion.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

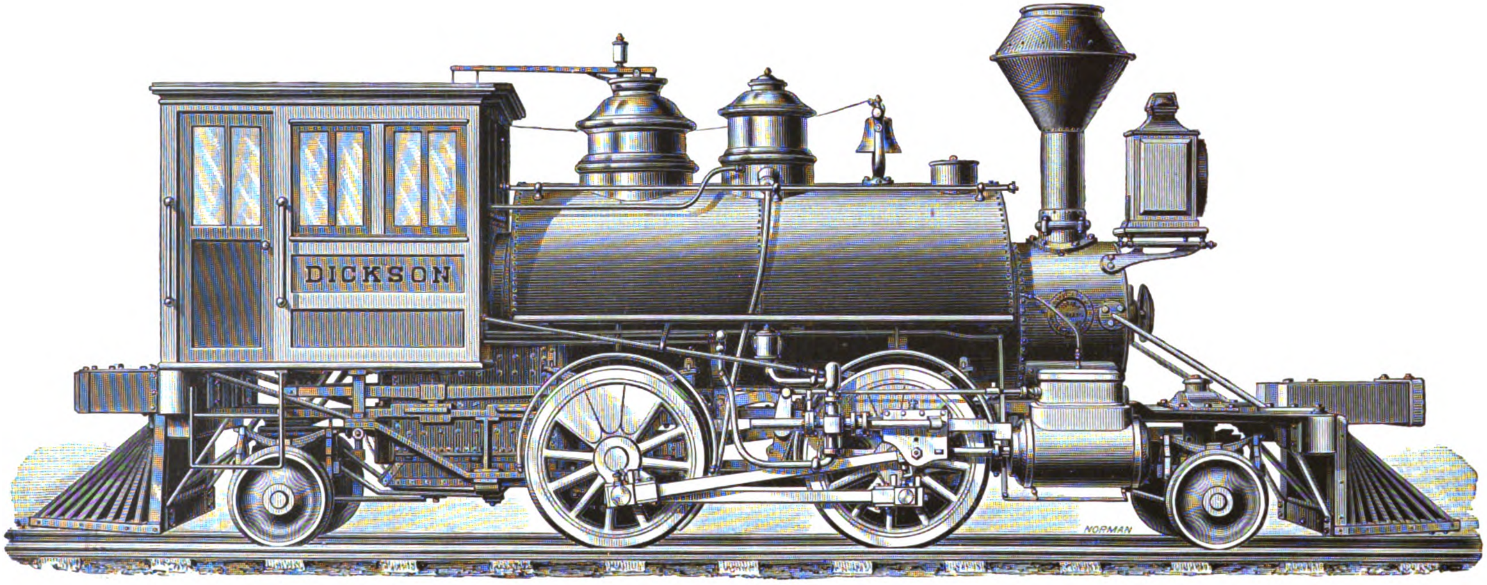
TANK.—Mounted on top of boiler or over truck.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

DOUBLE-ENDER LOCOMOTIVE—FOR SWITCHING OR SUBURBAN SERVICE.

CLASS J.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

DOUBLE-ENDER LOCOMOTIVE—FOR SWITCHING OR SUBURBAN SERVICE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	10—J	11—J	12—J	13—J	14—J	15—J	16—J	17—J
Cylinders, Diameter	10"	11"	12"	13"	14"	15"	16"	17"
" Stroke	16"	16"	18"	20"	20" or 22"	20" or 22"	22" or 24"	22" or 24"
Diameter of Driving Wheels	37½" to 42"	37½" to 42"	40" to 48"	40' to 48"	42" to 50"	44" to 53"	45" to 56"	50" to 60"
" Truck Wheels	24"	24" to 26"	24" to 26'	24" to 26"	24" to 28"	26" to 28'	26" to 30"	26" to 30"
Wheel Base, Rigid	5' 3"	5' 6"	5' 9"	6 ft.	6' 6"	7 ft.	7' 6"	7' 6"
" " Total	17 6½"	18' 2½"	19' 1½"	20' ½"	21' 2"	22' 3'	23' 4"	23' 9"
Length of Engine without Pilots	23' ½"	23' 8½"	24' 11½"	25' 11"	27' ½"	28' 3"	29' 4"	29' 9"
" " with Pilots	28' ½"	29' 2½"	30' 5½"	31' 11"	33' ½"	34" 9'	35' 10"	36' 3"
Weight, Loaded, Total	38,000 lbs.	44,000 lbs.	50,000 lbs.	56,000 lbs.	62,000 lbs.	68,000 lbs.	74,000 lbs.	80,000 lbs.
" " on Drivers	23,000 "	28,000 "	33,000 "	38,000 "	43,000 "	48,000 "	53,000 "	58,000 "
" " on Trucks	15,000 "	16,000 "	17,000 "	18,000 "	19,000 "	20,000 "	21,000 "	22,000 "
Capacity of Tank	400 gal.	450 gal.	500 gal.	625 gal.	700 gal.	800 gal.	900 gal.	1,000 gal.
Hauling Capacity on Level	525 tons.	650 tons.	775 tons	875 tons.	1,000 tons.	1,125 tons.	1,250 tons.	1,875 tons.
" " 20 ft. Grade	255 "	315 "	375 "	425 "	485 "	545 "	605 "	665 "
" " 40 ft. "	170 "	210 "	250 "	285 "	325 "	365 "	405 "	445 "
" " 60 ft. "	125 "	155 "	185 "	210 "	240 "	275 "	300 "	330 "
" " 80 ft. "	100 "	125 "	150 "	170 "	190 "	215 "	240 "	265 "
" " 100 ft. "	85 "	105 "	125 "	140 "	160 "	180 "	200 "	220 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

DOUBLE-ENDER LOCOMOTIVE.

CLASS J.

The so-called Double-Ender Locomotive, of which particulars are given on the two preceding pages, is designed for switching, suburban, or elevated railroad service, for all of which it is well adapted.

The tank is placed on top of the boiler directly over the driving wheels, which are of small diameter, and there are a leading and a trailing two-wheeled truck, equalized with the adjacent driving wheels, each with a swing bolster and radius bar. The engine has great adhesion in proportion to the total weight, takes curves with ease, runs steadily and equally well in either direction, and does not require turning round. These qualities are eminently suitable for an accelerated service in which rapid preparation, convenience, power, frequent stopping and quick starting are necessary.

On the following page we give the usual general specifications.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted in the larger boilers. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel; guide bars of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCKS.—Swing bolster, with radius bar, equalized with driving wheels; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

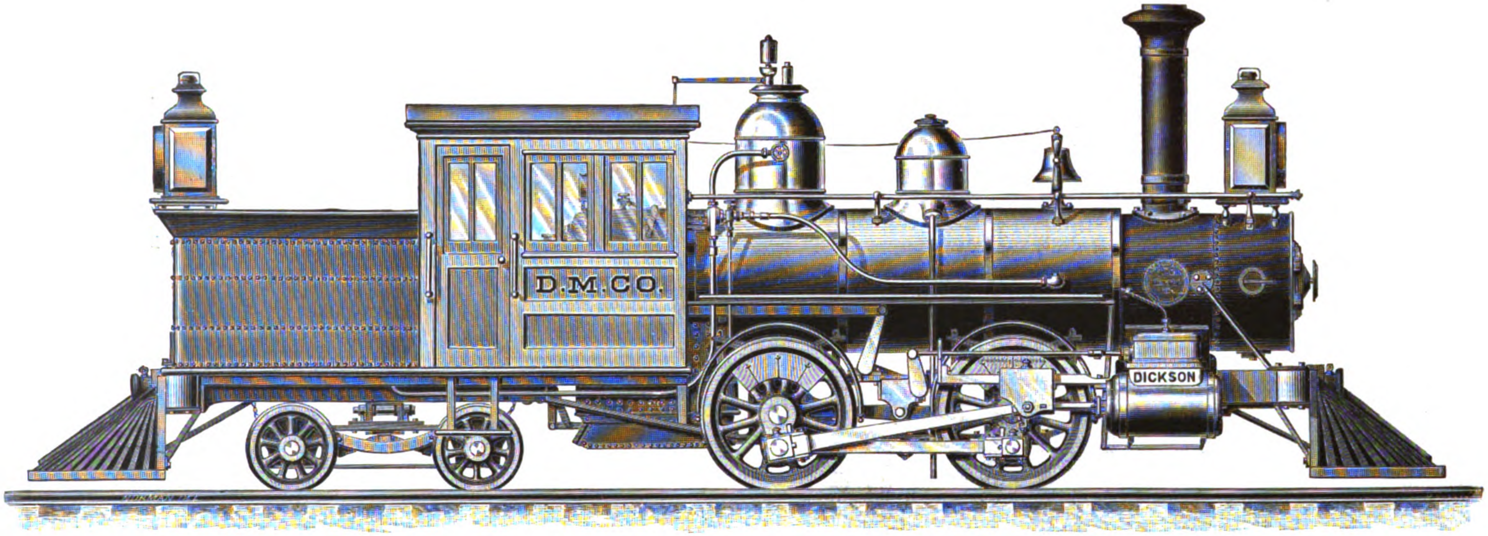
TANK.—Mounted on top of boiler.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

THE "FORNEY" TANK LOCOMOTIVE.

CLASS K.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

THE "FORNEY" TANK LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	10—K	11—K	12—K	13—K	14—K	15—K	16—K	17—K
Cylinders, Diameter	10″	11″	12″	13″	14″	15″	16″	17′
“ Stroke	16″	16″	18′	20″	20″ or 22″	20″ or 22″	22″ or 24″	22″ or 24″
Diameter of Driving Wheels	37½″ to 42″	37½″ to 42″	40″ to 48″	40″ to 48″	42″ to 50″	44″ to 53″	45″ to 56″	48″ to 56″
“ Truck Wheels	24″	24″ to 26″	24″ to 26″	24″ to 26″	24″ to 28″	24″ to 28″	26″ to 30″	26″ to 30″
Wheel Base, Rigid	5′ 0″	5′ 0″	5′ 6″	6′ 0″	6′ 6″	7′ 0″	7′ 6″	7′ 6″
“ “ Total	16′ 3″	16′ 6″	17′ 9″	18′ 6″	19′ 9″	20′ 7″	21′ 8″	22′ 6″
Length of Engine without Pilot	26′ 9″	27′ 7″	29′ 2″	30′ 1″	31′ 7″	32′ 10″	34′ 4″	35′ 3″
“ “ with Pilot	31′ 9″	33′ 1″	34′ 8″	36′ 1″	37′ 7″	38′ 10″	40′ 10″	41′ 9″
Weight Loaded, Total	39,000 lbs.	45,000 lbs.	51,000 lbs.	57,000 lbs.	63,000 lbs.	70,000 lbs.	77,000 lbs.	84,000 lbs.
“ “ on Drivers	27,000 “	31,000 “	35,000 “	39,000 “	43,000 “	48,000 “	53,000 “	58,000 “
“ “ on Truck	12,000 “	14,000 “	16,000 “	18,000 “	20,000 “	22,000 “	24,000 “	26,000 “
Capacity of Tank	600 gal.	700 gal.	800 gal.	900 gal.	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.
Hauling Capacity on Level	675 tons.	775 tons.	875 tons.	975 tons.	1,075 tons.	1,200 tons.	1,325 tons.	1,450 tons.
“ “ 20 ft. Grade	325 “	375 “	425 “	460 “	520 “	560 “	640 “	700 “
“ “ 40 ft. “	220 “	250 “	285 “	315 “	350 “	390 “	430 “	470 “
“ “ 60 ft. “	162 “	185 “	210 “	235 “	260 “	290 “	320 “	350 “
“ “ 80 ft. “	130 “	150 “	165 “	185 “	205 “	230 “	255 “	275 “
“ “ 100 ft. “	105 “	125 “	140 “	155 “	170 “	190 “	210 “	230 “
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

THE "FORNEY" TANK LOCOMOTIVE.

CLASS K.

The so-called "Forney" Tank Locomotive is particularly serviceable for suburban traffic, or for switching purposes, either on surface or elevated roads. It runs steadily and rides easily.

General specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger sizes double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes, cast iron with brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

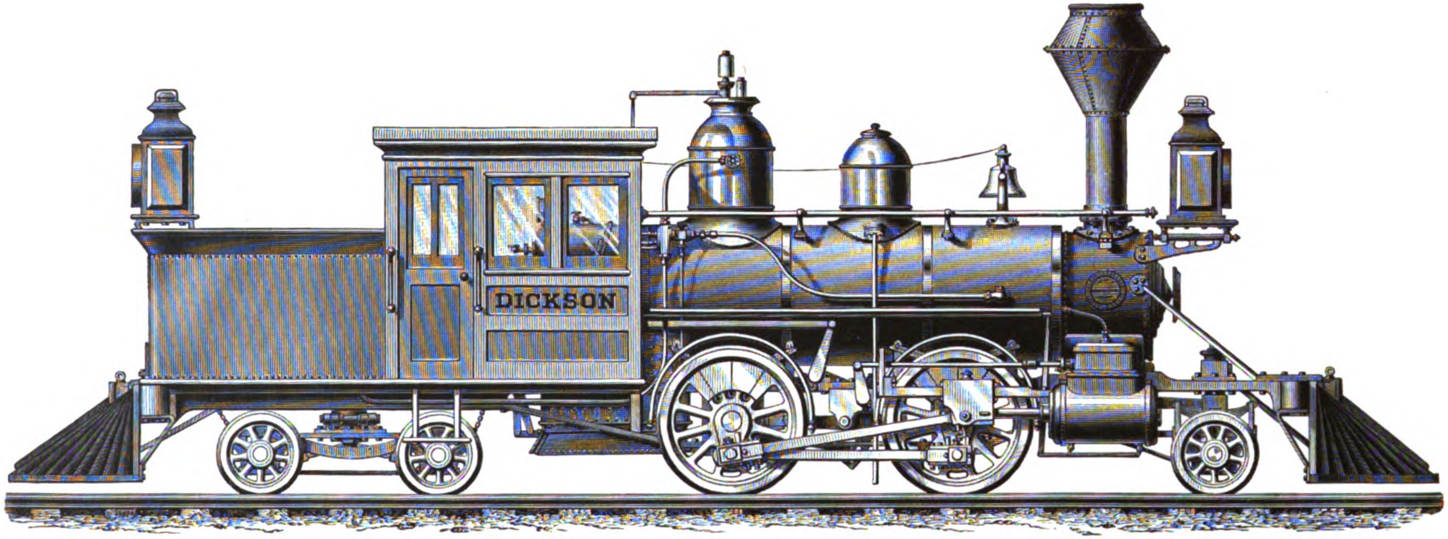
TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

DOUBLE-ENDER LOCOMOTIVE.

CLASS L.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

DOUBLE-ENDER LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS	10—L	11—L	12—L	13—L	14—L	15—L	16—L	17—L
Cylinders, Diameter	10"	11"	12"	13"	14"	15"	16"	17"
" Stroke	16"	16"	18"	20"	20" or 22"	20" or 22"	22" or 24"	22" or 24"
Diameter of Driving Wheels	37½" to 42"	37½" to 42"	40" to 48"	40" to 48"	42" to 50"	44" to 53"	45" to 56"	48" to 56"
" Truck Wheels	24"	24" to 26"	24" to 26"	24" to 26"	24" to 28"	24" to 28"	26" to 30"	26" to 30"
Wheel Base, Rigid	5' 3"	5' 6"	5' 9"	6 ft.	6' 6"	7 ft.	7' 6"	7' 6"
" " Total	22' 7"	23' 3"	24' 5"	25' 4"	26' 9"	27' 9"	29' 1"	29' 11"
Length of Engine without Pilots	28' 10"	29' 6"	31' 0"	32' 0"	33' 5"	34' 6"	36' 1"	36' 9"
" " with Pilots	33' 10"	35' 0"	36' 6"	38' 0"	39' 5"	40' 6"	42' 7"	43' 3"
Weight, Loaded, Total	42,000 lbs.	48,000 lbs.	54,000 lbs.	60,000 lbs.	67,000 lbs.	74,000 lbs.	81,000 lbs.	88,000 lbs.
" " on Drivers	24,000 "	27,000 "	30,000 "	33,000 "	37,000 "	41,000 "	45,000 "	49,000 "
" " on Trucks	18,000 "	21,000 "	24,000 "	27,000 "	30,000 "	33,000 "	36,000 "	39,000 "
Capacity of Tank	600 gal.	700 gal.	800 gal.	900 gal.	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.
Hauling Capacity on Level	550 tons.	625 tons.	700 tons.	750 tons.	850 tons.	950 tons.	1,050 tons.	1,150 tons.
" " 20 ft. Grade	265 "	305 "	340 "	365 "	410 "	460 "	510 "	560 "
" " 40 ft. "	180 "	205 "	230 "	245 "	275 "	310 "	345 "	375 "
" " 60 ft. "	135 "	150 "	170 "	180 "	205 "	230 "	255 "	275 "
" " 80 ft. "	95 "	120 "	135 "	145 "	165 "	180 "	200 "	220 "
" " 100 ft. "	90 "	100 "	110 "	120 "	135 "	150 "	165 "	185 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

DOUBLE-ENDER LOCOMOTIVE.

CLASS L.

The "Double-Ender" Locomotive is a type of engine well adapted to suburban service or switching, and is suitable for elevated as well as surface roads.

The tank is placed over the rear truck, and the variation in the quantity of fuel and water in service affects the adhesion of the driving wheels but slightly. The leading truck has a swing bolster and radius bar, allowing the engine to curve freely. The engine has great adhesion in proportion to its total weight, runs steadily and equally well in either direction, and does not require turning round. These qualities are highly important in an accelerated service in which rapid preparation, convenience, power, frequent stopping and quick starting are necessary.

On the following page we give the usual specifications.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger sizes double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

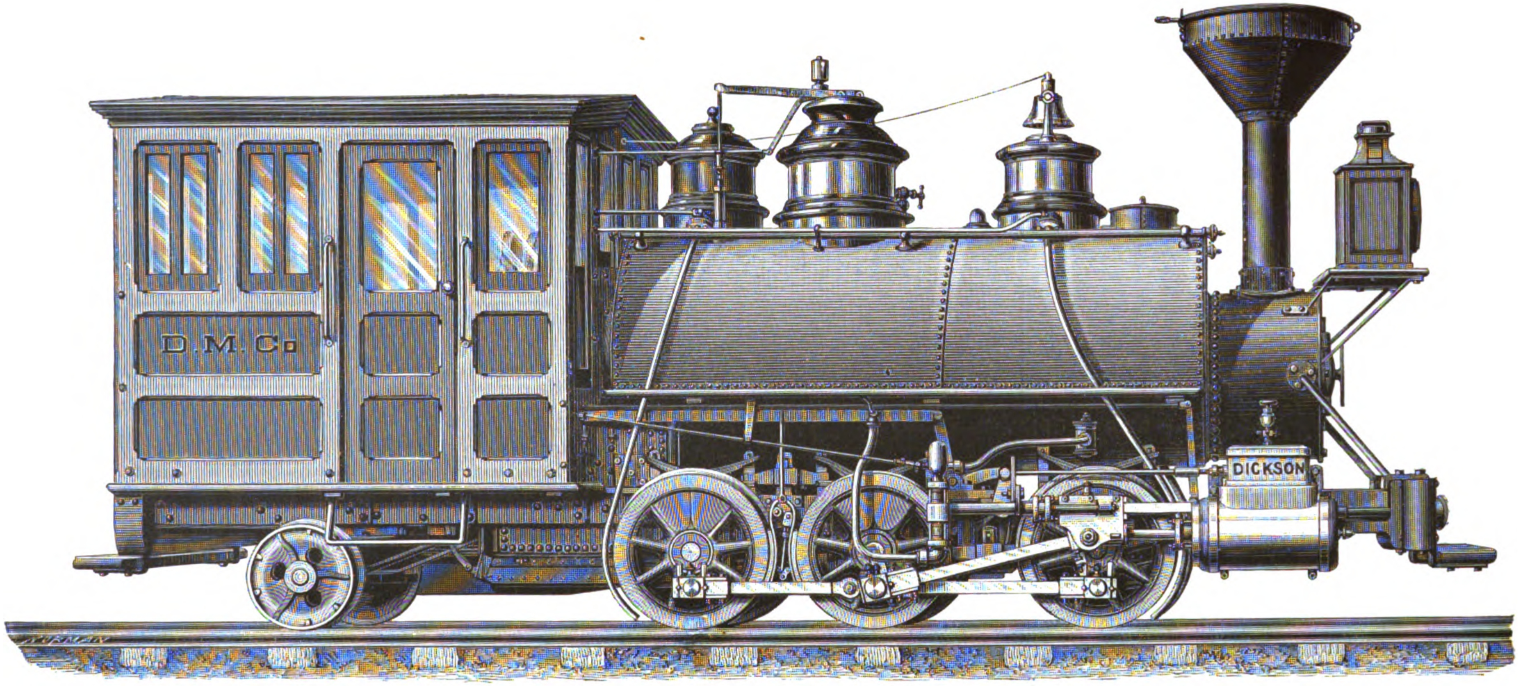
TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE—WITH TRAILING TRUCK.

CLASS M.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE—WITH TRAILING TRUCK.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—M	15—M	16—M	17—M	18—M	19—M		
Cylinders, Diameter	14"	15"	16"	17"	18"	19"		
" Stroke	22"	22"	22" or 24"	22" or 24"	22" or 24"	22" or 24"		
Diameter of Driving Wheels	40" to 50"	42" to 54"	42" to 54"	42" to 54"	44" to 56"	44" to 56"		
" Truck Wheels	26" to 30"	26" to 30"	26" to 30"	26" to 30"	28" to 30"	28" to 30"		
Wheel Base, Rigid	9' 9"	10' 0"	10' 0"	10' 3"	10 6"	10' 9"		
" " Total	18 3"	18' 9"	19' 3"	19' 9"	20' 6"	21' 0"		
Length of Engine without Pilots	30' 3"	31' 0"	32' 0"	32' 9"	34' 0"	34' 6"		
" " with One Pilot	33' 3"	34' 3"	35 3"	36' 3"	37' 6"	38' 0"		
Weight, Loaded, Total	69,000 lbs.	75.000 lbs.	81,000 lbs.	87,000 lbs.	93,000 lbs.	99,000 lbs.		
" " on Drivers	56,000 "	62,000 "	67,000 "	73,000 "	78,000 "	84,000 "		
" " on Truck	13,000 "	13,000 "	14,000 "	14,000 "	15,000 "	15,000 "		
Capacity of Tank	800 gal.	850 gal.	900 gal.	950 gal.	1,000 gal.	1,050 gal.		
Hauling Capacity on Level	1,350 tons.	1.475 tons.	1,625 tons.	1,750 tons.	1,875 tons.	2,000 tons.		
" " 20 ft. Grade	650 "	710 "	785 "	845 "	905 "	965 "		
" " 40 ft. "	435 "	475 "	525 "	565 "	605 "	645 "		
" " 60 ft. "	320 "	350 "	390 "	420 "	450 "	480 "		
" " 80 ft "	255 "	280 "	310 "	330 "	355 "	380 "		
" " 100 ft. "	210 "	230 "	255 "	275 "	295 "	315 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

TANK SWITCHING ENGINE.

CLASS M.

We give particulars of several sizes of this class of Switching Engine, which has six wheels coupled and a trailing two-wheeled truck. The tank is placed either over the boiler, as shown in the engraving, or over the truck.

The locomotive is designed for switching about depots and stations, or for logging or plantation service. The rear truck, which is used whether the tank is on the boiler or not, is of the swing-bolster, radius-bar kind, and permits the engine to pass around curves with safety, and increases its steadiness.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on top of boiler or over truck.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

TANK SWITCHING ENGINE.

CLASS N.

WITH LEADING AND TRAILING TRUCKS.

The Class "N" locomotive differs from Class "M" only in the addition of a leading two-wheeled truck, which has the effect to steady the engine when running forward, and does away with the necessity for turning the engine around.

We add a table of hauling capacities for this class, but the specifications are similar to those of Class "M."

SIX WHEELS COUPLED TANK SWITCHING ENGINE—With Leading and Trailing Two-Wheeled Trucks.

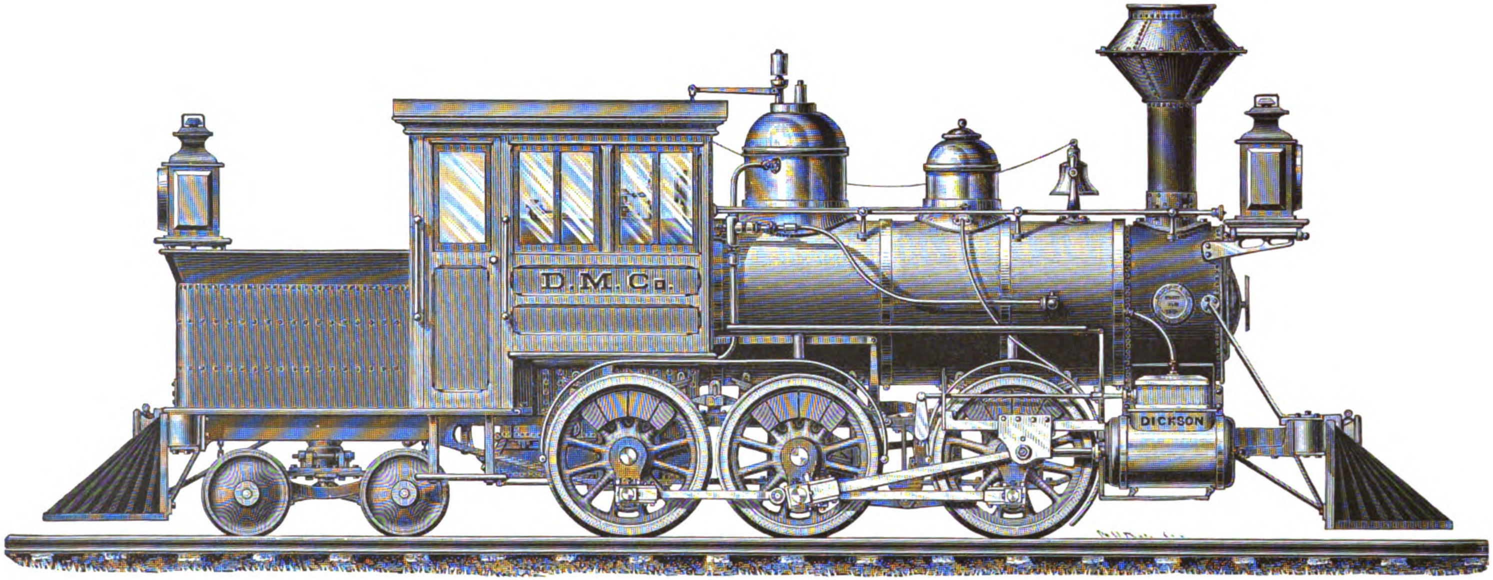
GAUGE, 4 FEET 8½ INCHES, FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—N	15—N	16—N	17—N	18—N	19—N		
Cylinders, Diameter	14″	15″	16″	17″	18″	19″		
" Stroke	22″	22″	22″ or 24″	22″ or 24	22″ or 24″	22″ or 24″		
Diameter of Driving Wheels	40″ to 50″	42″ to 54″	42″ to 54″	42″ to 54″	44″ to 56″	44″ to 56″		
" Truck Wheels	26″ to 30″	26″ to 30″	26″ to 30″	26″ to 30″	28″ to 30″	28″ to 30″		
Wheel Base, Rigid	9′ 9″	10′ 0″	10′ 0″	10′ 3″	10′ 6″	10′ 9″		
" " Total	22′ 6″	23′ 3″	23′ 9″	24′ 3″	25′ 4″	26′ 1″		
Length of Engine without Pilots	28′ 6″	29′ 3″	30′ 0″	30′ 9″	31′ 6″	32′ 3″		
" " with Two Pilots	34′ 6″	35′ 9″	36′ 6″	37′ 9″	38′ 6″	39′ 3″		
Weight, Loaded, Total	72,000 lbs.	78,000 lbs.	84,000 lbs.	90,000 lbs.	96,000 lbs.	102,000 lbs.		
" " on Drivers	53,000 "	58,000 "	63,000 "	68,000 "	73,000 "	78,000 "		
" " on Trucks	19,000 "	20,000 "	21,000 "	22,000 "	23,000 "	24,000 "		
Capacity of Tank	800 gal.	850 gal.	900 gal.	950 gal.	1,000 gal.	1,050 gal.		
Hauling Capacity on Level	1,250 tons.	1,375 tons.	1,500 tons.	1,600 tons.	1,725 tons.	1,850 tons.		
" " 20 ft. Grade	605 "	665 "	725 "	770 "	830 "	895 "		
" " 40 ft. "	405 "	445 "	485 "	515 "	555 "	595 "		
" " 60 ft. "	300 "	330 "	360 "	380 "	410 "	440 "		
" " 80 ft. "	235 "	260 "	285 "	305 "	325 "	350 "		
" " 100 ft. "	195 "	215 "	235 "	250 "	270 "	290 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

CLASS O.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—O	15—O	16—O	17—O	18—O	19—O		
Cylinders, Diameter	14"	15"	16"	17"	18"	19"		
" Stroke	22"	22"	22" or 24"	22" or 24"	22" or 24"	22" or 24"		
Diameter of Driving Wheels	40" to 50"	42" to 54"	42" to 54"	42" to 54"	44" to 56"	44" to 56"		
" Truck Wheels	26" to 30"	26" to 30"	26" to 30"	26" to 30"	28" to 30"	28" to 30"		
Wheel Base, Rigid	9' 9"	10' 0"	10' 0"	10' 3"	10' 6"	10' 9"		
" " Total	20' 9"	21' 3"	21' 9"	22' 6"	23' 0"	23' 6"		
Length of Engine without Pilot	32' 9"	33' 9"	34' 9"	35' 6"	36' 3"	37' 0'		
" " with one Pilot	35' 9"	37' 0"	38' 0"	38' 9"	39' 9"	40' 6"		
Weight, Loaded, Total	74,000 lbs.	80,000 lbs.	86,000 lbs.	92,000 lbs.	98,000 lbs.	104,000 lbs.		
" " on Drivers	54,000 "	58,000 "	62,000 "	66,000 "	72,000 "	77,000 "		
" " on Truck	20,000 "	22,000 "	24,000 "	26,000 "	26,000 "	27,000 "		
Capacity of Tank	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.	1,400 gal.	1,500 gal.		
Hauling Capacity on Level	1,300 tons.	1,400 tons.	1,500 tons.	1,625 tons.	1,750 tons.	1,900 tons.		
" " 20 ft. Grade	625 "	675 "	725 "	785 "	845 "	920 "		
" " 40 ft. "	420 "	450 "	485 "	525 "	565 "	615 "		
" " 60 ft. "	310 "	335 "	360 "	390 "	420 "	455 "		
" " 80 ft. "	245 "	265 "	285 "	310 "	330 "	360 "		
" " 100 ft. "	205 "	220 "	235 "	255 "	275 "	300 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

CLASS O.

The Class "O" locomotive is a very powerful type of engine for its weight, and is designed for service where frequent stops are necessary with heavy loads, and therefore where it will be possible to take water often. The tank is made small in order to keep down the dead weight of the engine and to shorten the wheel base. Although this engine is intended to be run in either direction, and is often so used, it will be found to "track" better and to diminish the wear of flanges if it is run backwards. It, however, runs steadily at all times, and is perfectly free from plunging. The position of the cab renders the engine remarkably easy riding.

The driving wheels are all equalized together, thus giving great vertical flexibility of wheel base. The truck is center bearing, and provided with a swing bolster.

We add general specifications.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger boilers double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes of cast iron with brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

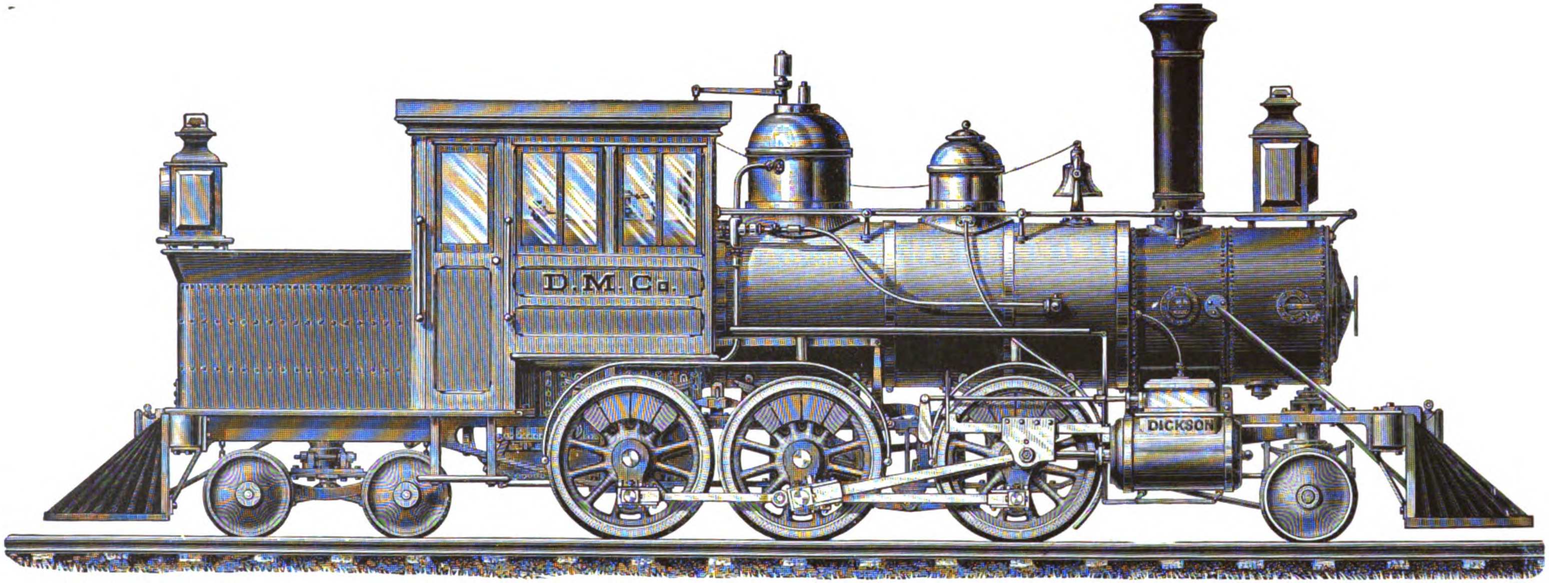
TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

CLASS P.



GAUGE, 4 FEET 8½ INCHES.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

GAUGE, 4 FEET 8½ INCHES. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	14—P	15—P	16—P	17—P	18—P	19—P		
Cylinders, Diameter	14″	15″	16″	17″	18″	19″		
" Stroke	22″	22″	22″ or 24″	22″ or 24″	22″ or 24″	22″ or 24″		
Diameter of Driving Wheels	40″ to 50″	42″ to 54″	42″ to 54″	42″ to 54″	44″ to 56″	44″ to 56″		
" Truck Wheels	26″ to 30″	26″ to 30″	26″ to 30″	26″ to 30″	28″ to 30″	28″ to 30″		
Wheel Base, Rigid	9′ 9″	10′ 0″	10′ 0″	10′ 3″	10′ 6″	10′ 9″		
" " Total	27′ 10″	28′ 6″	29 3″	30′ 0″	30′ 9″	31′ 6″		
Length of Engine without Pilot	34′ 9″	35′ 6″	36′ 3″	37′ 3″	38′ 0″	38′ 9″		
" " with one Pilot	37′ 9″	38′ 9″	39′ 6″	40′ 6″	41′ 6″	42′ 3″		
Weight Loaded, Total	78,000 lbs.	84,000 lbs.	90,000 lbs.	96,000 lbs.	102,000 lbs.	108,000 lbs.		
" " on Drivers	52,000 "	56,000 "	60,000 "	64,000 "	69,000 "	74,000 "		
" " on Truck	26,000 "	28,000 "	30,000 "	32,000 "	33,000 "	34,000 "		
Capacity of Tank	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.	1,400 gal.	1,500 gal.		
Hauling Capacity on Level	1,250 tons.	1,375 tons.	1,500 tons	1,600 tons.	1,725 tons.	1,850 tons.		
" " 20 ft. Grade	605 "	665 "	725 "	770 "	830 "	895 "		
" " 40 ft. "	405 "	445 "	485 "	515 "	555 "	595 "		
" " 60 ft. "	300 "	330 "	360 "	380 "	410 "	440 "		
" " 80 ft. "	235 "	260 "	285 "	305 "	325 "	350 "		
" " 100 ft. "	195 "	215 "	235 "	250 "	270 "	290 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

CLASS P.

The class "P" locomotive is offered as an excellent type of engine to conduct any heavy traffic in which stops and opportunities to take water are frequent. The tank is placed over the rear truck, and is made small in order to keep down the dead weight and to shorten the wheel base. It will be found to "track" well in either direction and will not require turning around.

The pony truck is provided with a swing bolster and radius bar, and is equalized with the front pair of driving wheels, the latter being equalized with each other. This arrangement gives great vertical flexibility to the wheel base, and the engine will ride smoothly over the poorest tracks. The rear truck is, like the pony truck, provided with a swing bolster. The engine is remarkably comfortable to the engine men, from the position of the cab; and for branch freight or mixed service, or, as indicated above, for any service where there are short runs and frequent stops necessitating power and quick starting, the performance will be in every way satisfactory.

Specifications follow.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as preferred; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

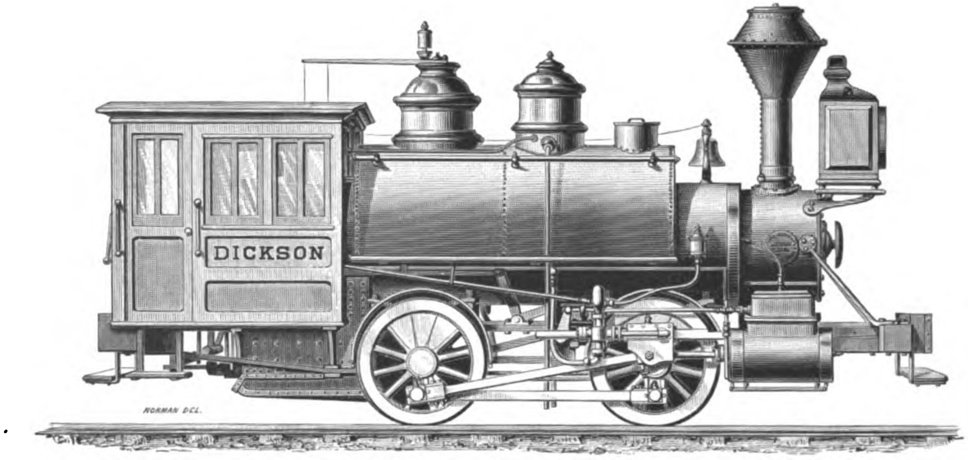
NARROW-GAUGE LOCOMOTIVES.

NARROW-GAUGE LOCOMOTIVES.

THE DICKSON MANUFACTURING COMPANY has always paid great attention to the design and construction of locomotives for narrow-gauge railroads, and they have built them for roads in all parts of the country. The same care and methods are used in their construction as are described in the preceding pages, and the classes there enumerated are built for narrow-gauge service, with such peculiarities as the service demands.

FOUR WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS A.



NARROW GAUGE.

FUEL, COAL OR WOOD.

TANK SWITCHING LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	8—A	9—A	10—A	11—A	12—A	13—A		
Cylinders, Diameter	8″	9″	10″	11″	12″	13″		
" Stroke	12″	14″	16″	16″	18″	18″		
Diameter of Driving Wheels	26″ to 30″	29″ to 33″	33″ to 36″	33″ to 36″	36″ to 40″	36″ to 40″		
Wheel Base	4′ 6″	5′ 0″	5′ 6″	6′ 0″	6′ 3″	6′ 6″		
Length of Engine	16′ 0″	17′ 3″	18′ 3″	19′ 8″	20′ 6″	21′ 3″		
Weight Loaded for Service	18,000 lbs.	23,000 lbs.	28,000 lbs.	33,500 lbs.	39,000 lbs.	45,000 lbs.		
Capacity of Tank in Gallons	250 gal.	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.		
Hauling Capacity on Level	400 tons.	525 tons.	650 tons.	775 tons.	900 tons.	1,050 tons.		
" " 20 ft. Grade	195 "	255 "	315 "	375 "	435 "	510 "		
" " 40 ft. "	130 "	170 "	210 "	250 "	290 "	345 "		
" " 60 ft. "	95 "	125 "	155 "	185 "	215 "	250 "		
" " 80 ft. "	75 "	100 "	125 "	145 "	170 "	200 "		
" " 100 ft. "	60 "	80 "	100 "	120 "	140 "	165 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

TANK SWITCHING LOCOMOTIVE.

CLASS A.

We present herewith the general dimensions, weights and hauling capacities of a number of the common sizes of the Four-Wheel Tank Switching Engine for the narrow gauge. This type of engine is designed specially for switching service in yards and stations, but can be used for short local runs.

The tank is placed on top of the boiler in order to utilize the weight for adhesion, and to dispense with a tender. By means of this construction the engine is short, and the engine men can observe yard operations somewhat better than if the engine were provided with a tender. The weight is equally distributed on all driving wheels, and there is a transverse equalizing beam connecting the springs of the forward driving wheels, an arrangement which contributes to steady motion and ease on the rails.

On the next page are given general specifications of this engine as we build them without special instructions.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top with one dome, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted on top of boiler.

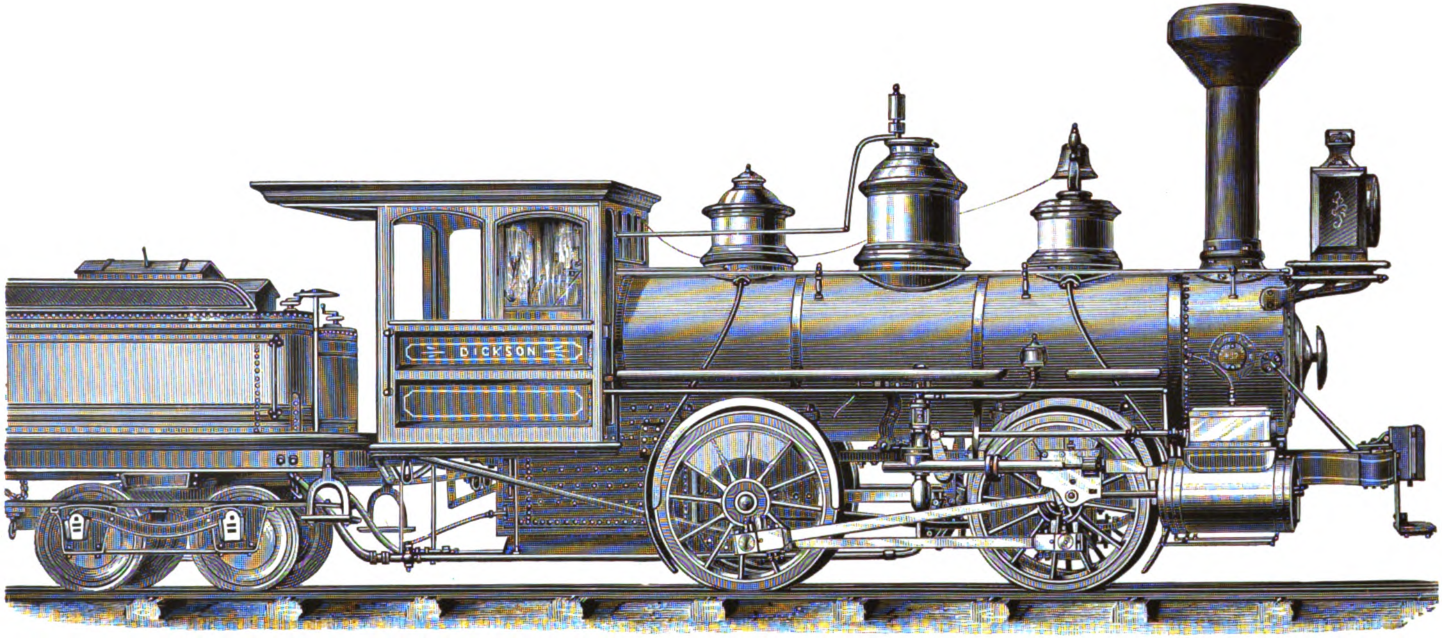
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

FOUR WHEELS COUPLED SWITCHING LOCOMOTIVE,

WITH TENDER. CLASS A.



NARROW GAUGE.

FUEL, COAL OR WOOD.

FOUR WHEELS SWITCHING LOCOMOTIVE—WITH TENDER.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS A	**9—A**	**10—A**	**11—A**	**12—A**	**13—A**			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
Wheel Base of Engine	5' 0"	5' 6"	6' 0"	6' 3"	6' 6"			
" " " and Tender	20' 7"	21' 4'	26' 3"	27' 2"	29' 2"			
Length of " " "	28' 10"	29' 10"	34' 3"	35' 9"	38' 0"			
Weight Loaded for Service	20,000 lbs.	24,000 lbs.	28,000 lbs.	33,000 lbs.	38,000 lbs.			
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,250 gal.			
Number of Wheels under Tender	4	4	8	8	8			
Hauling Capacity on Level	490 tons.	590 tons.	685 tons.	810 tons.	935 tons.			
" " 20 ft. Grade	230 "	280 "	325 "	385 "	445 "			
" " 40 ft. "	150 "	185 "	210 "	250 "	295 "			
" " 60 ft. "	110 "	135 "	155 "	175 "	215 "			
" " 80 ft. "	85 "	105 "	120 "	140 "	165 "			
" " 100 ft. "	70 "	85 "	95 "	115 "	135 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

FOUR-WHEEL SWITCHING LOCOMOTIVE.

CLASS A.

WITH TENDER.

We illustrate and give capacities of our Four-Wheel Switching Locomotive, with Tender, on the two preceding pages. It is designed for switching service in yards or stations, and can also be used for short runs on local roads.

The weight of the engine is equally distributed among the four driving wheels, and the front ends of the forward springs are connected by a transverse equalizing lever, which contributes to steadiness of motion and ease upon the road bed.

The tender is built with either four or six wheels or two four-wheeled trucks.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top with one dome, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; flues of best charcoal iron set with copper ferrules in both flue heads; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors, as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, secured to wrought iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes of cast iron with cast brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

TANK—Of ample capacity, made straight on top with flanges on sides and back, or made sloping on back to give the engineer a clear view in the rear. Mounted on either an oak or an iron frame, with four or six wheels, or two four-wheel trucks; wheels double plate, chilled face, hammered iron axles with brass bearings.

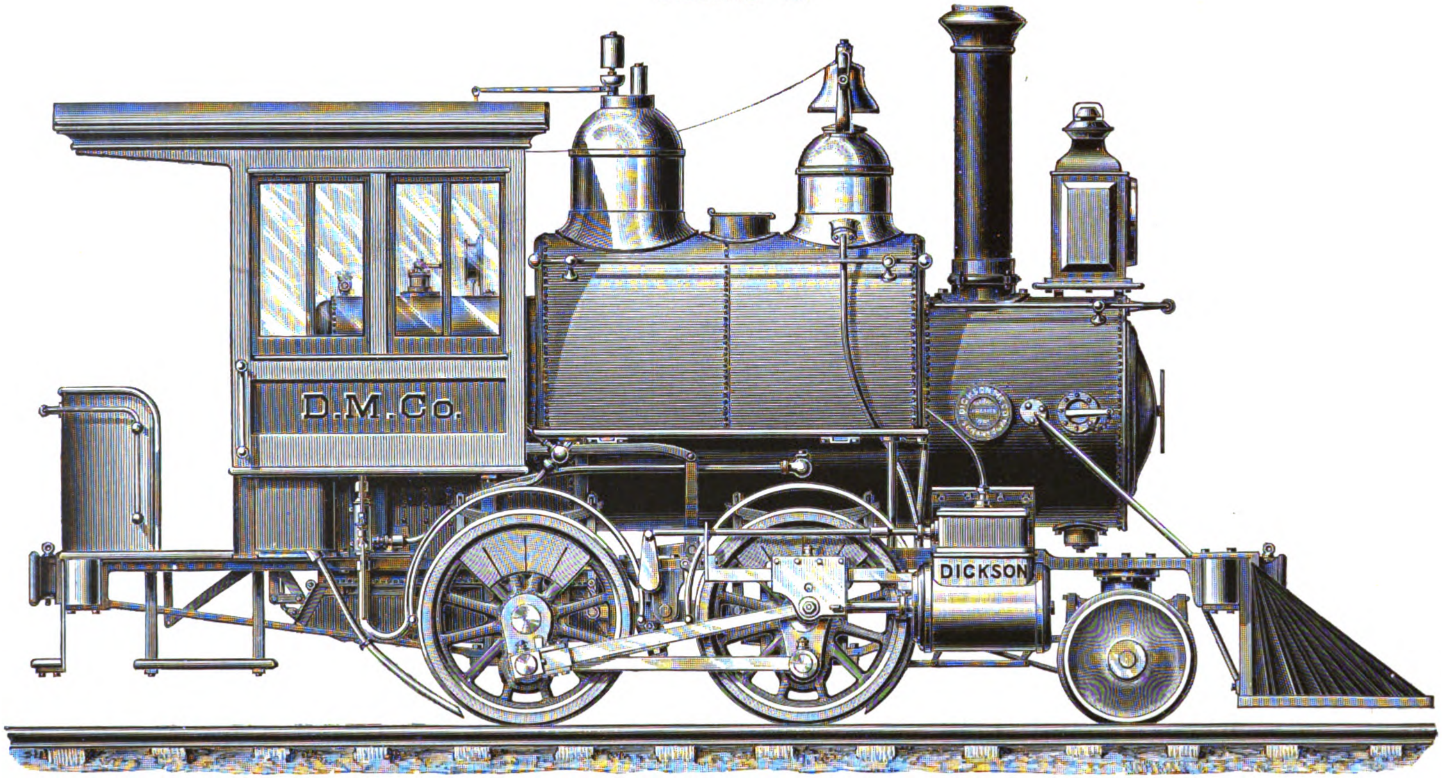
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

TANK SWITCHING ENGINE.

CLASS B.



NARROW GAUGE.

FUEL, COAL OR WOOD.

TANK SWITCHING ENGINE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9–B	10–B	11–B	12–B	13–B			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
" Truck Wheels	20"	22" to 24"	22" to 24"	24"	24"			
Wheel Base, Rigid	4' 0"	4' 3"	4' 6"	4' 9"	5' 0"			
" " Total	8' 11"	9' 8"	10' 0"	10' 6"	10' 10"			
Length of Engine	18' 3"	19' 6"	20' 3"	21' 0"	21' 9"			
Weight Loaded, Total	26,000 lbs.	31,000 lbs.	36,000 lbs.	42,000 lbs.	48,000 lbs.			
" " on Drivers	22,000 "	26,000 "	30,000 "	35,000 "	40,000 "			
" " on Truck	4,000 "	5,000 "	6,000 "	7,000 "	8,000 "			
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.			
Hauling Capacity on Level	500 tons.	600 tons.	700 tons	825 tons.	950 tons.			
" " 20 ft. Grade	240 "	290 "	340 "	400 "	460 "			
" " 40 ft. "	160 "	195 "	225 "	265 "	310 "			
" " 60 ft. "	120 "	145 "	170 "	195 "	225 "			
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "			
" " 100 ft. "	80 "	95 "	110 "	130 "	150 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

TANK SWITCHING LOCOMOTIVE.

CLASS B.

The Class "B" Tank Switching Locomotive, of which we present the leading particulars of various sizes, is designed chiefly for switching purposes, but can be used to draw suburban service trains with satisfaction on account of the leading swing-bolster, radius-bar truck. This keeps the engine steady at the higher speeds, and allows it to take curves with ease.

General specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable. heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axle; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on top of boiler.

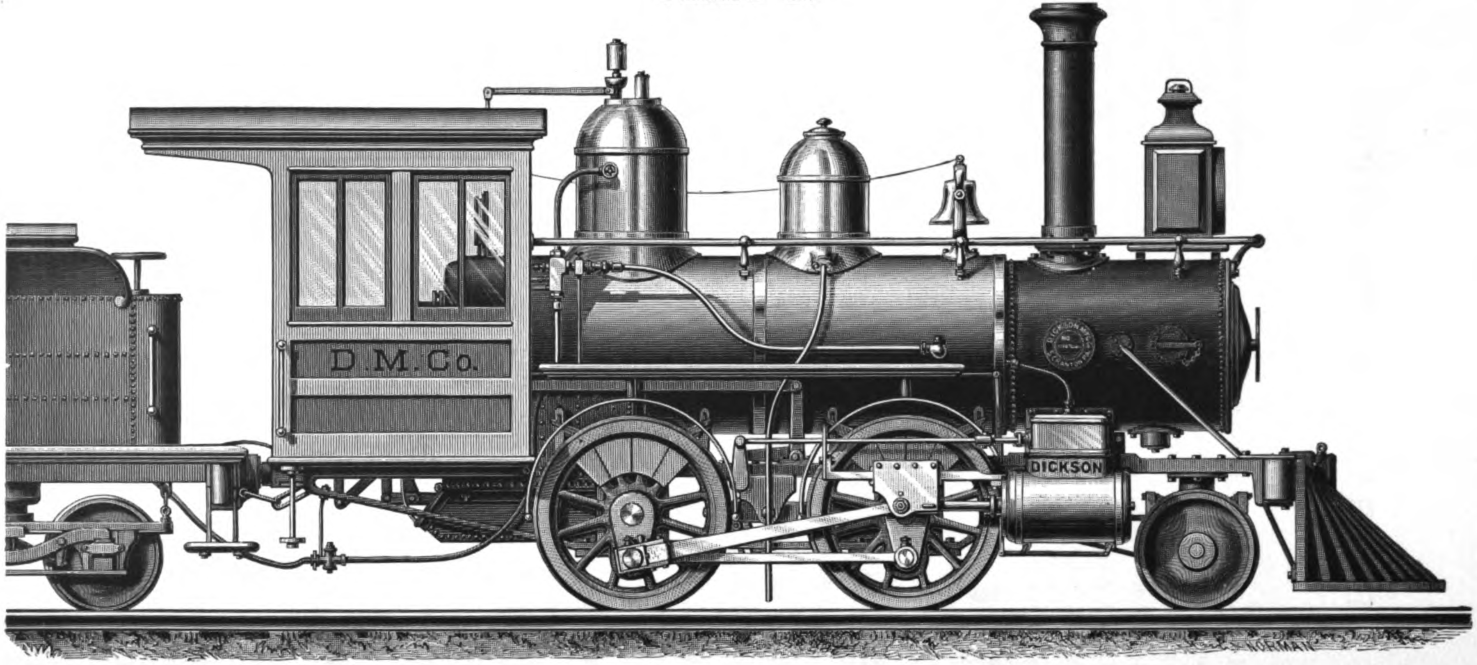
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser,

PASSENGER OR SWITCHING ENGINE—WITH TENDER.

CLASS B.



NARROW GAUGE.

FUEL, COAL OR WOOD.

PASSENGER OR SWITCHING ENGINE—WITH TENDER.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9—B	10—B	11—B	12—B	13—B			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
" Truck Wheels	20"	22" to 24"	22" to 24"	24"	24"			
Wheel Base, Rigid	4' 0"	4' 3"	4' 6"	4' 9"	5' 0"			
" " Total	8' 11"	9' 8"	10' 0"	10' 6"	10' 10"			
" " Engine and Tender	24' 6"	25' 6"	30' 1"	31' 4"	33' 6"			
Length of Engine and Tender	31' 10"	33' 3"	37' 0"	39' 0"	41' 3"			
Weight, Loaded, Total	22,000 lbs.	26,500 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.			
" " on Drivers	18,000 "	22,000 "	26,000 "	30,000 "	34,000 "			
" " on Truck	4,000 "	4,500 "	5,000 "	6,000 "	7,000 "			
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,250 gal.			
Hauling Capacity on Level	440 tons.	540 tons.	635 tons.	735 tons.	835 tons.			
" " 20 ft. Grade	210 "	255 "	300 "	345 "	395 "			
" " 40 ft. "	135 "	170 "	195 "	225 "	260 "			
" " 60 ft. "	100 "	120 "	140 "	165 "	190 "			
" " 80 ft. "	75 "	95 "	110 "	125 "	145 "			
" " 100 ft. "	60 "	75 "	90 "	105 "	120 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

PASSENGER OR SWITCHING ENGINE.

CLASS B.

The Class "B" Passenger or Switching Engine, of which particulars are herewith given, is designed for the passenger or general service of suburban or branch roads, or for switching service. The leading truck, which has a swing bolster and radius bar, keeps the engine steady at the higher speeds, and allows it to take curves with ease.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on oak or iron frame, with four wheels or two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

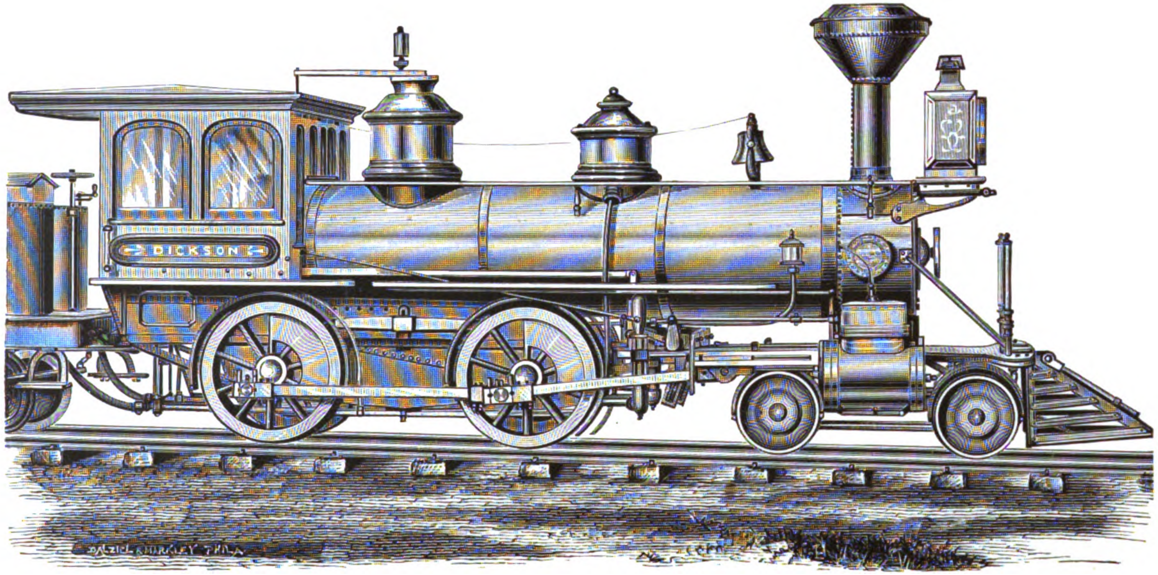
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

"AMERICAN" TYPE LOCOMOTIVE—FOR PASSENGER OR FREIGHT SERVICE.

CLASS C.



NARROW GAUGE.

FUEL, COAL OR WOOD.

"AMERICAN" TYPE LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SEVEN SIZES OF THIS CLASS.

CLASS C	9—C	10—C	11—C	12—C	13—C	14—C	15—C
Cylinders, Diameter	9"	10"	11"	12"	13"	14"	15"
" Stroke	14"	16"	16"	18"	18"	20"	20"
Diameter of Driving Wheels	36"	36" to 42"	36" to 42"	40' to 48"	42" to 50"	44" to 52"	44" to 54"
" Truck "	22"	24	24"	24"	26"	26"	26"
Wheel Base, Rigid	6' 0"	6' 4"	6' 8"	7' 0"	6' 9"	7' 0"	7' 6'
" " Total	16' 4"	17' 0"	17' 6"	18' 3"	18' 5"	18' 11"	20' 0'
" " Engine and Tender	33' 1"	33' 9"	34' 8"	37' 5"	40' 9"	41' 7"	43' 3'
Length of Engine and Tender	39' 3'	40' 0"	41' 5"	44' 6"	47' 11"	48' 11"	50' 9'
Weight of Engine Loaded, Total	28,000 lbs.	32,000 lbs.	36,000 lbs.	40,000 lbs.	45,000 lbs.	50,000 lbs.	55,000 lbs.
" " " on Drivers	18,000 "	21,000 "	24,000 "	27,000 "	31,000 "	35,000 "	39,000 "
" " " on Truck	10,000 "	11,000 "	12,000 "	13,000 "	14,000 "	15,000 "	16,000 "
Capacity of Tank	900 gal.	1,000 gal.	1,100 gal.	1,250 gal.	1,400 gal.	1,500 gal.	1,600 gal.
Hauling Capacity on Level	440 tons.	515 tons.	585 tons.	660 tons.	760 tons.	855 tons.	955 tons.
" " 20 ft. Grade	210 "	245 "	275 "	315 "	360 "	405 "	440 "
" " 40 ft. "	135 "	160 "	180 "	205 "	235 "	265 "	295 "
" " 60 ft. "	100 "	115 "	130 "	150 "	170 "	190 "	215 "
" " 80 ft. "	75 "	90 "	100 "	115 "	135 "	150 "	165 "
" " 100 ft. "	60 "	70 "	80 "	95 "	110 "	120 "	135 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$

"AMERICAN" TYPE LOCOMOTIVE.

CLASS C.

FUEL, COAL OR WOOD.

We devote the two preceding pages to representations and particulars of what has been of late years called, by general consent, the "American" type of locomotive, as we build them for burning coal or wood. It has received the name, not because engines nearly identical in design with it have not been used in other countries, but because it is extremely popular and common in the United States, and is regarded here as the most fit type for conducting nearly all passenger service, and all freight service within the limits of its capacity. As offered by the best builders it is probably the cheapest machine for its weight and power made, and there is but little opportunity for distinguishing characteristics as designed by different manufacturers.

The forward end of the locomotive rests on a pivot on the truck which permits the truck to turn and accommodate itself to curvature of track, and on crooked or poorly aligned roads the pivot is permitted to have some lateral movement by means of the "swing bolster" of the truck. The rear end of the engine rests on the driving wheels, through the intervention of equalizing levers or beams, the effect of which arrangement, it can be shown, is that each side of the back end of the locomotive rests on a single point. This property, taken in connection with the central support at the truck, is very important, as it is equivalent to the whole locomotive resting on three points, an arrangement which is in accordance with the mechanical principle that when a body rests on three points it is absolutely free to accommodate itself to them. It should also be stated that an effect of equalizing beams is to give the wheels great vertical flexibility in their movements when passing over inequalities of the track.

In the larger sizes of this locomotive the fire box is placed entirely above the frame, in order to gain grate surface. When this is done, the frame slants down as it goes from the back to the forward axle, and joins the jaw opposite the axle center. This enables the proper depth of fire box to be secured forward.

To the features of the design of this type of locomotive, as briefly described above, are to be ascribed its success in this country, as it will run steadily and keep on tracks so poorly constructed as to cause a less flexible engine to leave the rails.

On the following page we present general specifications of this type of engine as we build them in the absence of special directions.

* * *

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

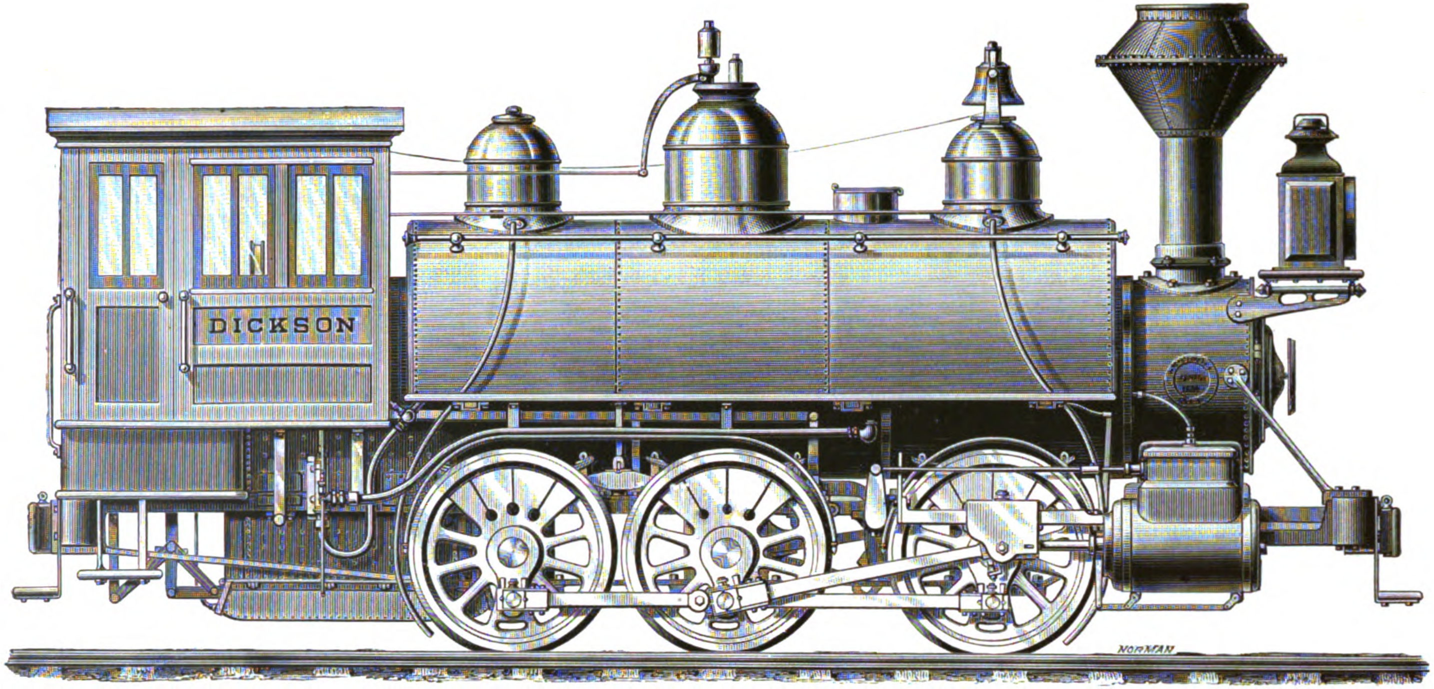
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS D.

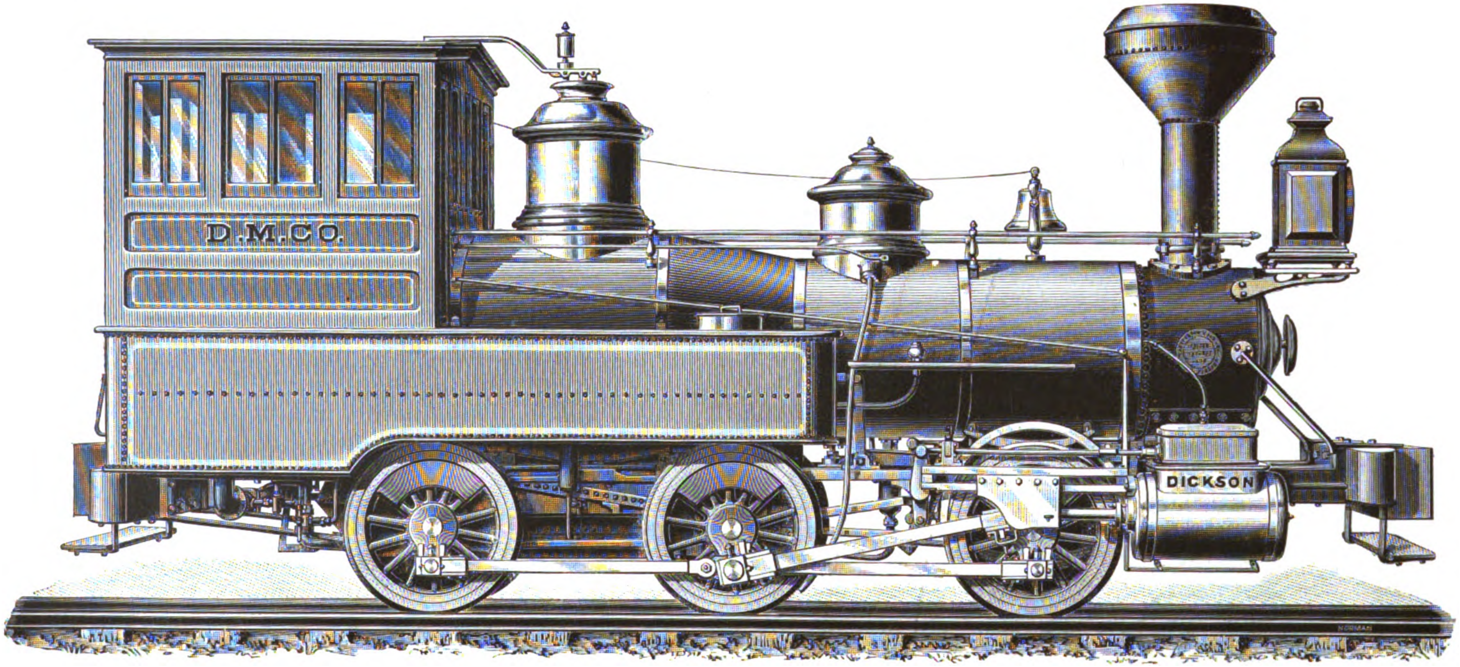


NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED TANK SWITCHING LOCOMOTIVE.

CLASS D.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS TANK SWITCHING LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—D	10—D	11—D	12—D	13—D	14—D		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16"	16'	18"	18'	18"		
Diameter of Driving Wheels	28' to 30"	30" to 33"	33" to 36"	36" to 40"	36' to 40"	36" to 40'		
Wheel Base	6' 4"	6' 8'	7' 0"	7' 6"	8' 0"	8' 6"		
Length of Engine	17' 9"	18' 8"	19' 7"	20' 7"	21' 7'	22' 3"		
Weight, ready for service	26,000 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.	46,500 lbs.	52,000 lbs.		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level	600 tons.	725 tons.	825 tons.	950 tons.	1,075 tons.	1,200 tons.		
" " 20 ft. Grade	290 "	350 "	400 "	460 "	520 "	580 "		
" " 40 ft. "	195 "	235 "	265 "	310 "	350 "	390 "		
" " 60 ft. "	145 "	175 "	200 "	230 "	260 "	290 "		
" " 80 ft. "	115 "	140 "	155 "	180 "	205 "	230 "		
" " 100 ft. "	95 "	115 "	130 "	150 "	170 "	190 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX-WHEEL TANK SWITCHING ENGINE.

CLASS D.

We devote the three preceding pages to views and particulars of the Six-Wheel Tank Switching Engine, which is designed for switching service in yards and depots of stations, and can also be used for short runs on local roads.

These engines are built with the tank placed either on the top or sides of the boiler, thereby utilizing all the weight for adhesion, which is equally distributed among the wheels. There is an equalizing lever between the middle and back driving wheels on each side, and the front driving wheels are equalized transversely, thus giving the engine an easy and steady motion.

General specifications will be found on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; tubes of best charcoal iron set with copper ferrules in both tube sheets; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but can make the middle pair of wheels with plain tires if required.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted either on top or sides of boiler.

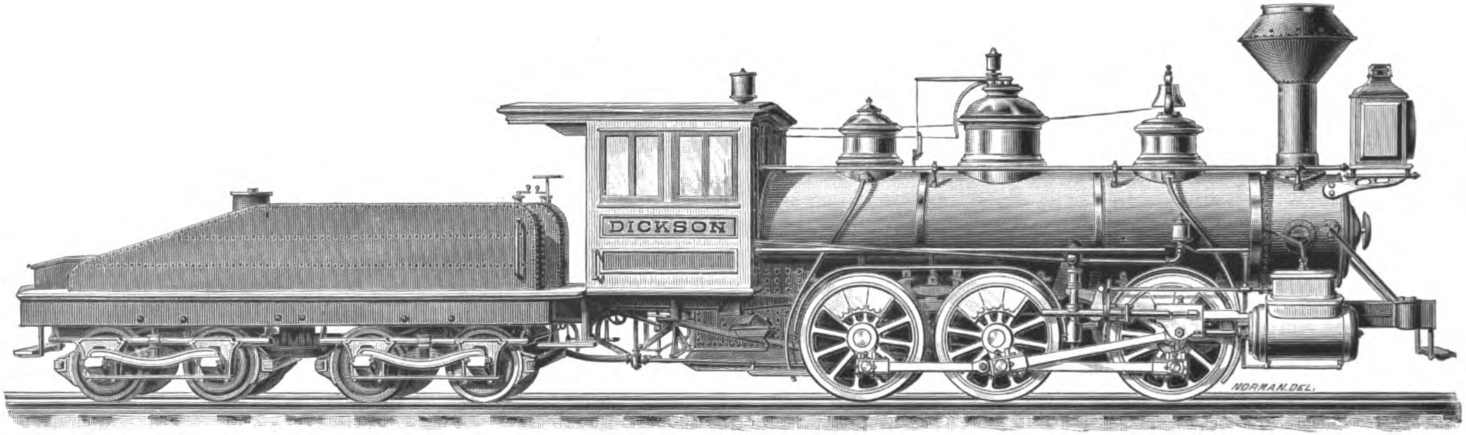
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE,

WITH TENDER. CLASS D.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS SWITCHING LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—D	10—D	11—D	12—D	13—D	14—D		
Cylinders, Diameter	9″	10″	11″	12″	13″	14″		
" Stroke	14″	16″	16″	18″	18″	18″		
Diameter of Driving Wheels	28″ to 30″	30″ to 33″	33″ to 36″	36″ to 40″	36″ to 40″	36″ to 40″		
Wheel Base of Engine	6′ 4″	6′ 8″	7′ 0″	7′ 6′	8′ 0″	8′ 6″		
" " " and Tender	20′ 11″	21′ 6″	26′ 0″	27′ 1″	29′ 3″	30′ 5″		
Length of Engine and Tender	29′ 1″	30′ 0″	33′ 10″	35′ 6″	38′ 0″	39′ 2″		
Weight of Engine, ready for service	22,000 lbs.	26,000 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.	46,000 lbs.		
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.		
Hauling Capacity on Level	540 tons.	640 tons.	760 tons.	885 tons.	1,010 tons.	1,135 tons.		
" " 20 ft. Grade	255 "	305 "	360 "	420 "	480 "	540 "		
" " 40 ft. "	170 "	200 "	235 "	275 "	315 "	360 "		
" " 60 ft. "	120 "	145 "	170 "	200 "	230 "	260 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "	205 "		
" " 100 ft. "	75 "	95 "	115 "	130 "	145 "	165 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX-WHEEL SWITCHING LOCOMOTIVE.

CLASS D.

WITH TENDER.

On the two preceding pages we illustrate and present the principal particulars of the Six-Wheel Switching Locomotive, with tender, which is designed for switching service in yards and stations, and for short runs on local roads.

The weight of the engine is equally distributed among the six wheels, thus utilizing all the weight for adhesion, and there is an equalizing lever between the middle and back driving wheels on each side. There is also a transverse equalizing lever connecting the front ends of the forward springs.

The tender has either a straight or sloping top, and is provided with six wheels, or two four-wheeled trucks. The sloping top permits a clearer view of the track near the engine.

General specifications are given on the following page.

GENERAL SPECIFICATIONS.

BOILER.—Straight on top, or wagon top, as may be required. Smoke box made the usual length, using a bonnet or diamond smoke stack, or with an extension and spark arrester inside and a straight smoke stack. Material, best cold-blast charcoal iron, or all-guaranteed steel plate if required; all longitudinal seams on the larger boilers double riveted. Fire box of steel, of ample size for generating steam; tubes of best charcoal iron set with copper ferrules in both tube sheets; steam dome fitted with balanced throttle valve, one steam whistle and two safety valves of improved make; boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket; feed water supplied with one pump and one injector, or two injectors as required.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with cast brass bearings; crank pins of steel. Unless otherwise ordered on this class of locomotive we put flanges on all the wheels, but can make the middle pair of wheels with plain tires if required.

CAB—Of hard wood with plate-glass windows.

TANK—Of ample capacity, made straight on top with flanges on sides and back, or made sloping on back to give the engineer a clear view in the rear. Mounted on either an oak or an iron frame, with six wheels or two four-wheel trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

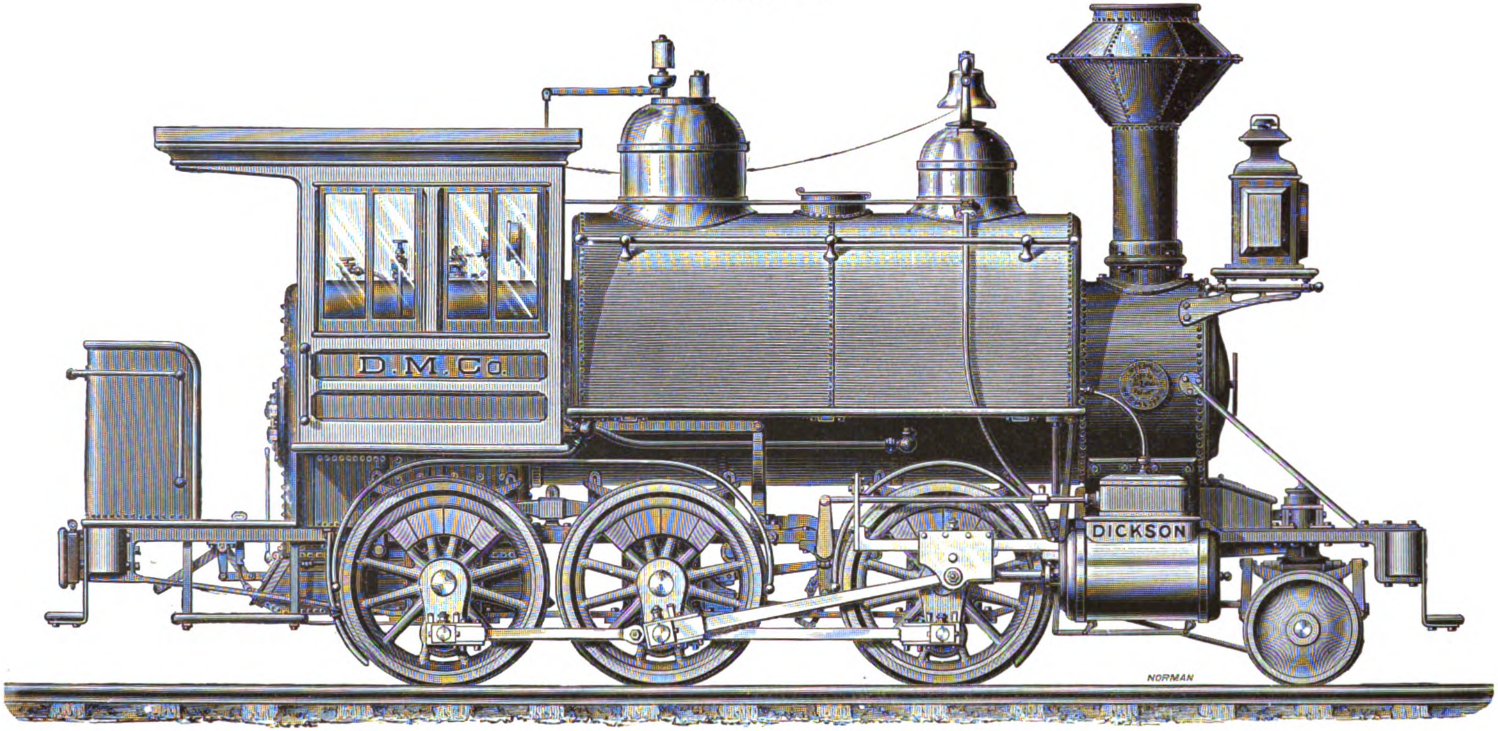
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one or two sand boxes; brackets and shelf for head light; gauge lamp, and all necessary oil cups.

PAINTING.—Engine and tender neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE.

CLASS E.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED SWITCHING LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—E	10—E	11—E	12—E	13—E	14—E		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16"	16"	18"	18"	18'		
Diameter of Driving Wheels	28" to 30"	30" to 33"	33" to 36"	36" to 40"	36" to 40"	36" to 40"		
" Truck Wheels	20"	20" to 24"	20" to 24"	24"	24"	24"		
Wheel Base, Rigid	6' 4"	6' 8"	7' 0"	7' 6"	8' 0"	8' 6"		
" " Total	11' 4½"	12' 2"	12' 7"	13' 3"	13' 8"	14' 7"		
Length of Engine	19' 9"	21' 0"	21' 10"	22' 8"	23' 9"	24' 8"		
Weight, Loaded, Total	28,000 lbs.	33,000 lbs.	38,000 lbs.	43,000 lbs.	49,000 lbs.	55,000 lbs.		
" " on Drivers	22,000 "	26,000 "	30,000 "	35,000 "	40,000 "	45,000 "		
" " on Trucks	6,000 "	7,000 "	8,000 "	8,000 "	9,000 "	10,000 "		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level	500 tons.	600 tons.	700 tons.	825 tons.	950 tons.	1,075 tons.		
" " 20 ft. Grade	240 "	290 "	340 "	400 "	460 "	520 "		
" " 40 ft. "	160 "	195 "	225 "	265 "	310 "	350 "		
" " 60 ft. "	120 "	145 "	170 "	200 "	230 "	260 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "	205 "		
" " 100 ft. "	80 "	95 "	110 "	130 "	150 "	170 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED TANK LOCOMOTIVE.

CLASS E.

On the preceding page we present the general dimensions, weights and hauling capacities of several sizes of the six wheels coupled "Tank Switching" Locomotive, with pony truck. This is designed for switching service, or for very short runs in the suburban service of cities or for logging service. It is also well adapted to elevated railroads, as it runs steadily and passes with ease around curves of short radius.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted in the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar, equalized with driving wheels; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted on top of boiler.

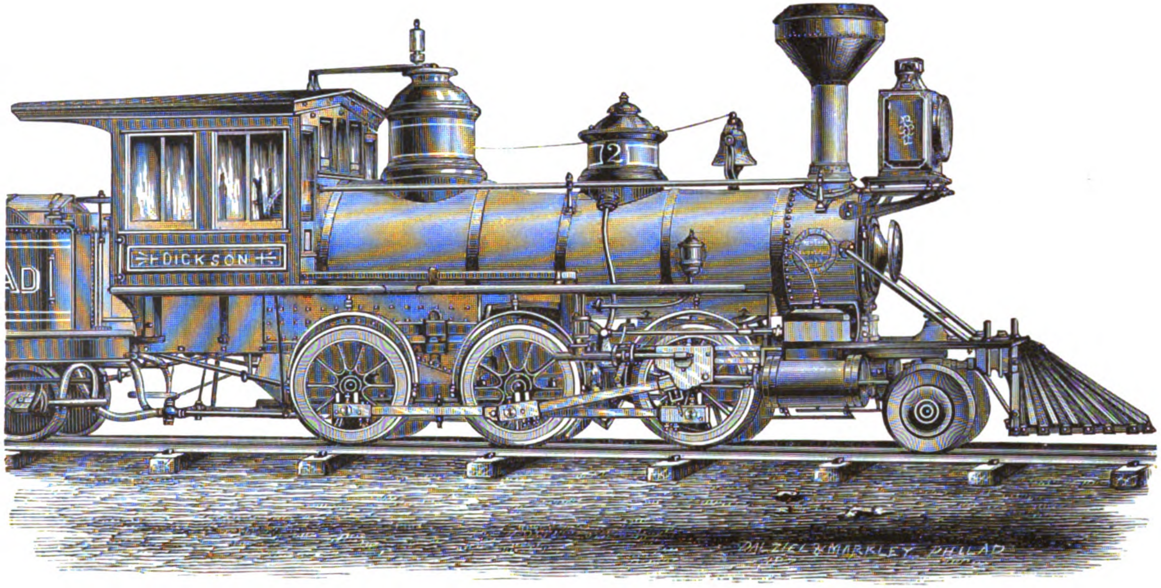
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

CLASS E.



NARROW GAUGE.

FUEL, COAL OR WOOD.

"MOGUL" LOCOMOTIVE—FOR FREIGHT SERVICE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS E	10—E	11—E	12—E	13—E	14—E	15—E		
Cylinders, Diameter	10″	11″	12″	13″	14″	15″		
" Stroke	16″	16″	16″	18″	18″	18″ or 20″		
Diameter of Driving Wheels	36″	36″	36″	36″ to 40″	36″ to 40″	36″ to 42″		
" Truck "	24″	24″	24″	24″	24″ to 26″	24″ to 26″		
Wheel Base, Rigid	10′ 8″	11′ 2″	11′ 8″	11′ 0″	11′ 0″	11′ 0″		
" " Total	16′ 1″	16′ 10″	17′ 4″	16′ 10″	16′ 11″	17′ 1″		
" " Engine and Tender	32′ 9″	33′ 11″	35′ 11″	36′ 6″	37′ 7″	39′ 0″		
Length of Engine and Tender	39′ 9″	41′ 5″	43′ 8″	44′ 6″	45′ 9″	47′ 2″		
Weight of Engine Loaded, Total	32,000 lbs.	36,000 lbs.	41,000 lbs.	46,000 lbs.	51,000 lbs.	56,000 lbs.		
" " " on Drivers	27,000 "	31,000 "	35,000 "	40,000 "	44,000 "	48,000 "		
" " " on Truck	5,000 "	5,000 "	6,000 "	6,000 "	7,000 "	8,000 "		
Capacity of Tank	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.	1,400 gal.	1,500 gal.		
Hauling Capacity on Level	665 tons.	760 tons.	860 tons.	985 tons.	1,080 tons.	1,180 tons.		
" " 20 ft. Grade	315 "	360 "	410 "	470 "	515 "	560 "		
" " 40 ft. "	210 "	235 "	270 "	310 "	335 "	370 "		
" " 60 ft. "	150 "	160 "	195 "	225 "	245 "	270 "		
" " 80 ft. "	120 "	135 "	150 "	175 "	190 "	210 "		
" " 100 ft. "	95 "	110 "	125 "	145 "	155 "	170 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

"MOGUL" LOCOMOTIVE.

CLASS E.

FOR COAL OR WOOD.

On the two preceding pages we give an illustration and table of principal particulars of the locomotive known as the "Mogul" (so called because the first one of its type was named "Mogul").

Of late years this style of engine has come into use for heavy freight service, and weighs considerably more than the "American" type. The greater portion of its weight is carried on driving wheels, and as there are six of them, among which the weight is equally distributed, the pressure of each wheel on the rail is kept within a safe limit. The pilot truck is provided with a swing bolster and radius bar, which allows the engine to "take" curves with ease and safety even at high speeds, as is proved by their successful use for express passenger service in some instances. The weight on the truck is only sufficient to keep the engine securely on the track, and to gradually bring the rails down to the level to which they will be brought by the greater weight on the driving wheels. This is a matter of considerable importance, and is often overlooked. We build these engines with flanges on all the wheels, some of which have had fifteen feet of rigid wheel base, and after a year's service on a line having curves of ten degrees, show no appreciable signs of wear on flanges.

"Mogul" Engines for anthracite coal have the driving wheels equally spaced from each other, and in the larger sizes the fire box is placed above the frames, in order to have as large a grate area as possible without making the length of the fire box excessive.

We have made the building of the "Mogul" engine almost a specialty at our works, and recommend it as an economical type of engine for heavy service, and one which will do twenty-five per cent. more work than the "American" type for the same number of engine and train men.

On the following page are given general specifications of "Mogul" Engines, as we build them without special instructions.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

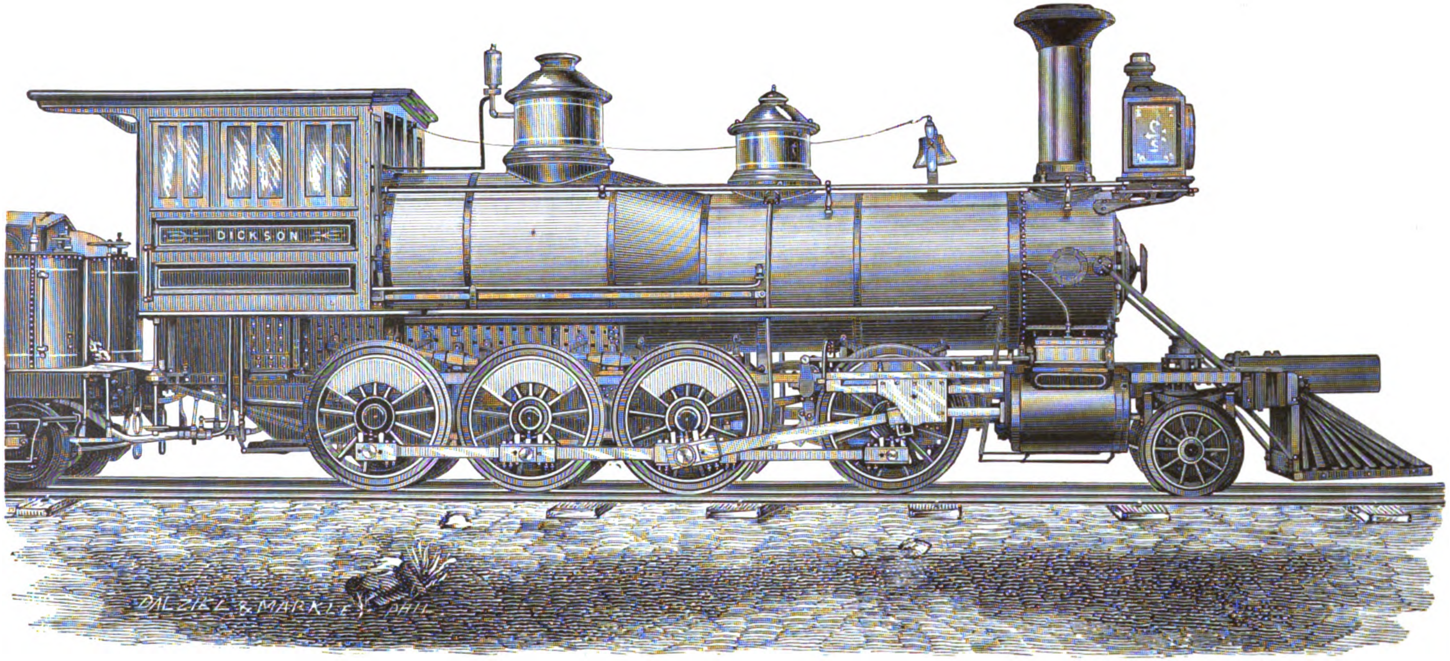
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

"CONSOLIDATION" LOCOMOTIVE.

CLASS H.



NARROW GAUGE.

FUEL, COAL OR WOOD.

"CONSOLIDATION" LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF THREE SIZES OF THIS CLASS.

CLASS	14—H	15—H	16—H
Cylinders, Diameter	14″	15′	16′
" Stroke	18″	20″	20″
Diameter of Driving Wheels	36″	38″	38′
" Truck Wheels	24″	24′	24″
Wheel Base, Rigid	11′ 6′	11′ 9′	12′ 0″
" " Total	17′ 10″	18′ 5′	18′ 8′
" " Engine and Tender	38′ 3″	39′ 7′	40′ 8″
Length of " " "	46″ 5′	47′ 9″	48′ 10′
Weight, Loaded, Total	56,000 lbs.	61,000 lbs.	67,000 lbs.
" " on Drivers	48,000 "	53,000 "	58,000 "
" " on Trucks	8,000 "	8,000 "	9,000 "
Capacity of Tank	1,400 gal.	1,500 gal.	1,600 gal.
Hauling Capacity on Level	1,180 tons.	1,305 tons.	1,430 tons.
" " 20 ft. Grade	560 "	620 "	680 "
" " 40 ft. "	370 "	410 "	450 "
" " 60 ft. "	270 "	300 "	330 "
" " 80 ft. "	210 "	235 "	255 "
" " 100 ft. "	170 "	190 "	210 "
Prices ready for service at works in Scranton	$	$	$

CONSOLIDATION LOCOMOTIVE.

CLASS H.

On the two preceding pages we give the leading particulars of the "Consolidation" Locomotive (which received its name from that of the first one built), which is now in common use for very heavy freight service, and as helpers or pushers on heavy grades. It is the heaviest type commonly built, is the most economical for the service for which it is designed, and will do from forty to fifty per cent. more work with the same number of engine and train men than the "American" type.

There are eight coupled wheels, and a two-wheeled pilot truck in front with a swinging bolster or center, and a radius bar of the proper length to allow the engine to pass easily around curves. We have built such engines having fifteen feet of rigid wheel base with flanges on all the wheels, which after a year's service on a line having curves of ten degrees, show no appreciable signs of wear on the flanges. On the larger sizes we make the boiler with the fire box on top of the frames, in order to gain eight or nine inches in width, and thus increase the grate area some twenty-five per cent. which is essential for free steaming. The boilers are made either straight or wagon top, with or without the extended smoke box, and with a grate either for anthracite or bituminous coal, or wood.

On the following page are given general specifications as we generally build these locomotives.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger boilers double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of wrought iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCKS.—Swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on either an oak or an iron frame, with two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

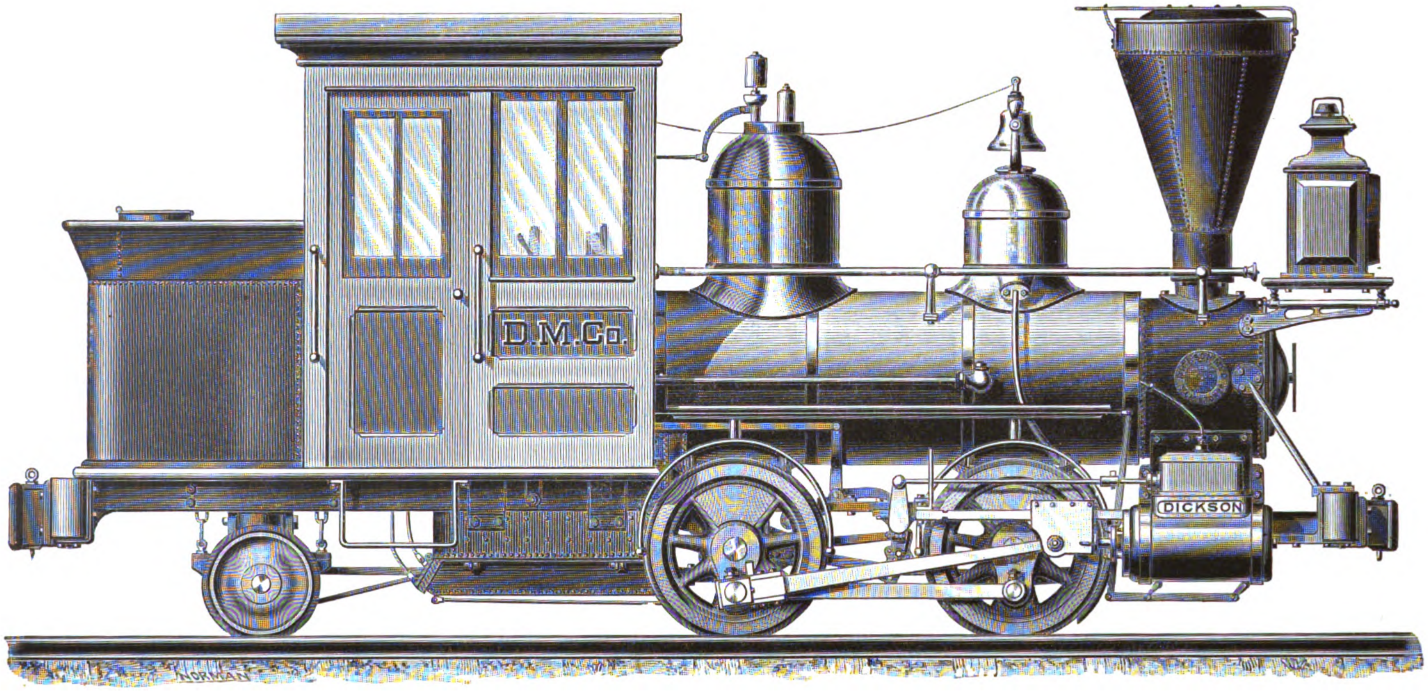
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SWITCHING ENGINE—WITH TANK.

CLASS I.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SWITCHING ENGINE–WITH TANK.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	8–1	9–1	10–1	11–1	12–1	13–1		
Cylinders, Diameter	8″	9″	10″	11″	12″	13″		
" Stroke	12″	14″	16″	16″	18″	18″		
Diameter of Driving Wheels	26″ to 30″	30″ to 33″	33″ to 36″	33″ to 36″	36″ to 40″	36″ to 40″		
" Truck Wheels	18″	20″	22″ to 24″	22″ to 24″	24″	24″		
Wheel Base, Rigid	3′ 9″	4′ 0″	4′ 3″	4′ 6″	4′ 9″	5′ 0″		
" " Total	9′ 9″	10′ 9″	11′ 8″	12′ 9″	13′ 7″	14′ 6″		
Length of Engine	18′ 3″	19′ 9″	21′ 3″	22′ 4″	23′ 6″	24′ 6″		
Weight, Loaded, Total	22,000 lbs.	26,000 lbs.	31,000 lbs.	36,000 lbs.	42,000 lbs.	48,000 lbs.		
" " on Drivers	18,000 "	22,000 "	26,000 "	30,000 "	35,000 "	40,000 "		
" " on Trucks	4,000 "	4,000 "	5,000 "	6,000 "	7,000 "	8,000 "		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level	400 tons.	500 tons.	600 tons.	700 tons.	825 tons.	950 tons.		
" " 20 ft. Grade	195 "	240 "	290 "	340 "	400 "	460 "		
" " 40 ft. "	130 "	160 "	195 "	225 "	265 "	310 "		
" " 60 ft. "	95 "	120 "	145 "	170 "	195 "	225 "		
" " 80 ft. "	75 "	95 "	115 "	135 "	155 "	180 "		
" " 100 ft. "	65 "	80 "	95 "	110 "	130 "	150 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

TANK SWITCHING ENGINE.

CLASS I.

The Class "I" Tank Switching Locomotive, of which we present particulars, is made with the tank as shown on the engraving, or on top of the boiler, and is designed for switching, or for logging or plantation service. The rear truck, which is used whether the tank is on the boiler or not, is of the swing-bolster, radius-bar kind, and has a general steadying effect upon the engine when in motion.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

TANK.—Mounted on top of boiler or over truck.

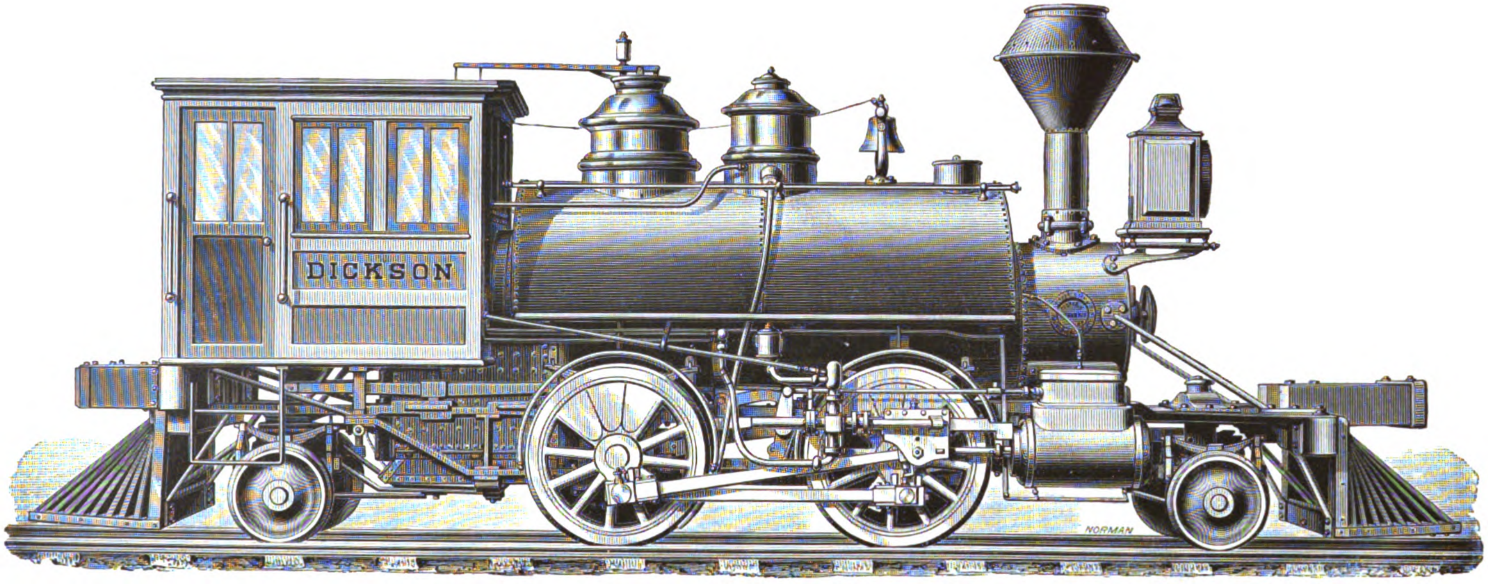
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

DOUBLE-ENDER TANK LOCOMOTIVE.

CLASS J.



NARROW GAUGE.

FUEL, COAL OR WOOD.

DOUBLE-ENDER TANK LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9—J	10—J	11—J	12—J	13—J			
Cylinders, Diameter	9″	10″	11″	12″	13″			
" Stroke	14″	16″	16″	18″	18″			
Diameter of Driving Wheels	30″ to 33″	33″ to 36″	33″ to 36″	36″ to 40″	36″ to 40″			
" Truck Wheels	20″	22″ to 24″	22″ to 24″	24″	24″			
Wheel Base, Rigid	4′ 0″	4′ 3″	4′ 6″	4′ 9″	5′ 0″			
" " Total	15′ 3″	16′ 6″	17′ 6″	18′ 3″	19′ 1″			
Length of Engine without Pilots	20′ 1″	21′ 9″	22′ 9″	23′ 9″	24′ 7″			
" " with Pilots	24′ 1″	26′ 3″	27′ 3″	28′ 9″	29′ 7″			
Weight, Loaded, Total	29,000 lbs.	34,000 lbs.	39,000 lbs.	44,500 lbs.	50,000 lbs.			
" " on Drivers	20,000 "	24,000 "	28,000 "	33,000 "	38,000 "			
" " on Trucks	9,000 "	10,000 "	11,000 "	11,500 "	12,000 "			
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.			
Hauling Capacity on Level	450 tons.	550 tons.	650 tons.	775 tons.	900 tons.			
" " 20 ft. Grade	220 "	265 "	315 "	375 "	435 "			
" " 40 ft. "	145 "	180 "	210 "	250 "	290 "			
" " 60 ft. "	110 "	130 "	155 "	185 "	215 "			
" " 80 ft. "	85 "	105 "	125 "	150 "	170 "			
" " 100 ft. "	70 "	85 "	105 "	125 "	145 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

DOUBLE-ENDER LOCOMOTIVE.

CLASS J.

The so-called Double-Ender Locomotive, of which particulars are given on the two preceding pages, is designed for switching, suburban, or elevated railroad service, for all of which it is well adapted.

The tank is placed on top of the boiler directly over the driving wheels, which are of small diameter, and there are a leading and a trailing two-wheeled truck, equalized with the adjacent driving wheels, each with a swing bolster and radius bar. The engine has great adhesion in proportion to the total weight, takes curves with ease, runs steadily and equally well in either direction, and does not require turning round. These qualities are eminently suitable for an accelerated service in which rapid preparation, convenience, power, frequent stopping and quick starting are necessary.

On the following page we give the usual general specifications,

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted in the larger boilers. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel; guide bars of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCKS.—Swing bolster, with radius bar, equalized with driving wheels; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on top of boiler.

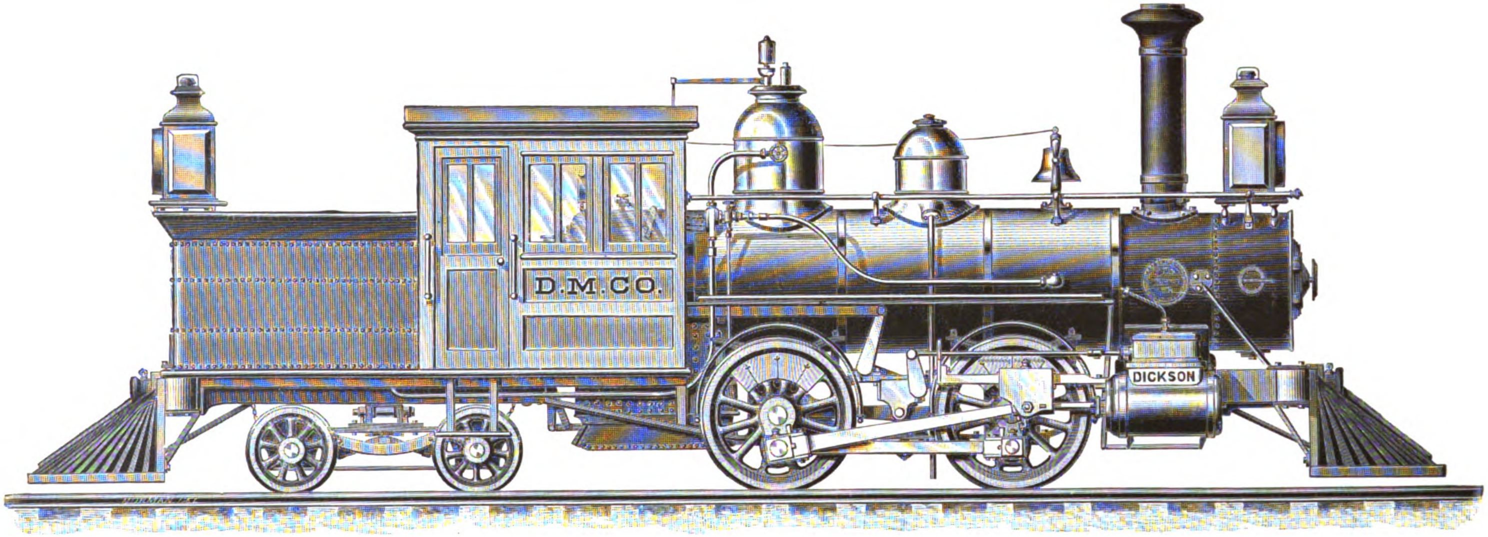
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly p ted and varnished, and lettered and numbered to suit the purchaser.

THE "FORNEY" TANK LOCOMOTIVE.

CLASS K.



NARROW GAUGE.

FUEL, COAL OR WOOD.

THE "FORNEY" TANK LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9—K	10—K	11—K	12—K	13—K			
Cylinders, Diameter	9″	10″	11″	12″	13″			
" Stroke	14″	16″	16″	18″	18″			
Diameter of Driving Wheels	29″ to 33″	33″ to 36″	33″ to 36″	36″ to 40″	36″ to 40″			
" Truck Wheels	20″ to 22″	22″ to 24″	22″ to 24″	24″	24″			
Wheel Base, Rigid	4′ 0″	4′ 3″	4′ 6″	4′ 9″	5′ 0″			
" " Total	13′ 10″	15′ 4″	16′ 3″	17′ 0″	18′ 3″			
Length of Engine without Pilot	22′ 2″	23′ 10″	25′ 4″	26′ 7″	28′ 0″			
" " with Pilot	26′ 2″	28′ 4″	29′ 10″	31′ 7″	33′ 0″			
Weight Loaded, Total	30,000 lbs.	35,000 lbs.	40,000 lbs.	45,500 lbs.	51,000 lbs.			
" " on Drivers	22,000 "	26,000 "	30,000 "	34,000 "	39,000 "			
" " on Truck	8,000 "	9,000 "	10,000 "	11,500 "	12,000 "			
Capacity of Tank	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.			
Hauling Capacity on Level	525 tons.	625 tons.	725 tons.	825 tons.	950 tons.			
" " 20 ft. Grade	255 "	305 "	350 "	400 "	460 "			
" " 40 ft. "	170 "	205 "	235 "	265 "	310 "			
" " 60 ft. "	125 "	150 "	175 "	195 "	225 "			
" " 80 ft. "	100 "	120 "	140 "	155 "	180 "			
" " 100 ft. "	85 "	100 "	115 "	130 "	150 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

THE "FORNEY" TANK LOCOMOTIVE.

CLASS K.

On the preceding page we present the general dimensions and hauling capacities of several sizes of the so-called "Forney" Locomotive for narrow-gauge, surface or elevated railroads.

This engine is well suited to suburban or switching service, runs steadily, rides easily, and possesses great adhesion in proportion to the total weight.

By placing the driving wheels wholly in front of the fire box, and otherwise modifying the construction slightly from that shown in the engraving, the fire box can be made of any desirable width. This type of engine is thus easily adapted to heavy narrow-gauge service

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger boilers double riveted Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles if required; axle boxes of cast iron with brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

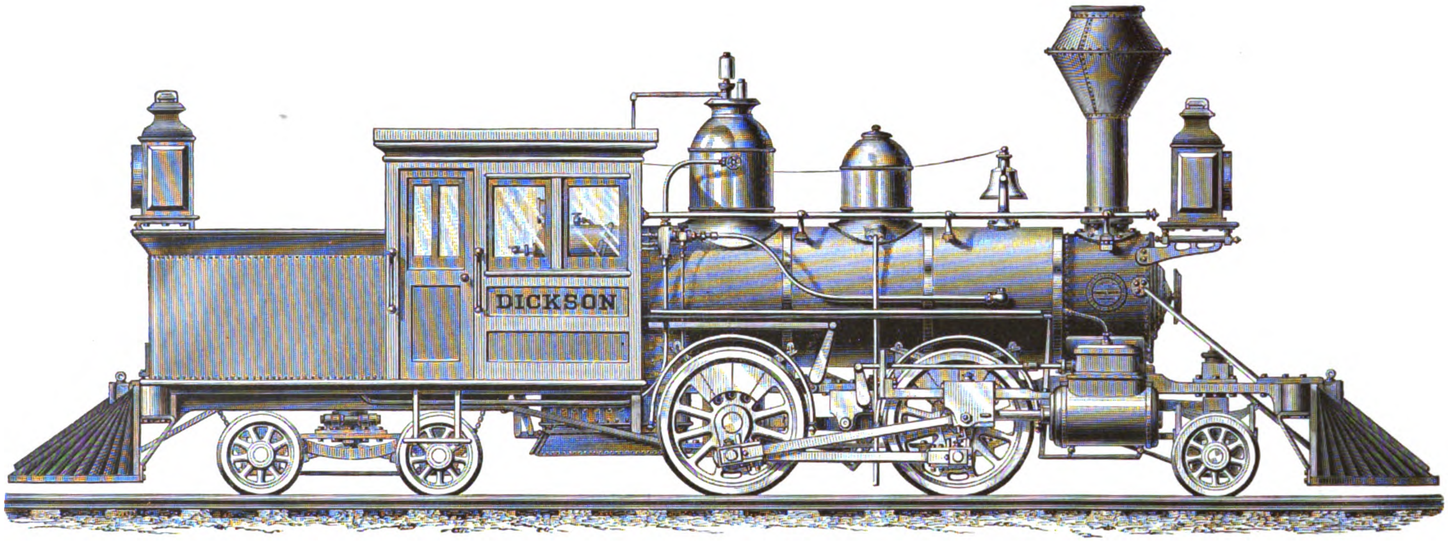
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

DOUBLE-ENDER LOCOMOTIVE.

CLASS L.



NARROW GAUGE.

FUEL, COAL OR WOOD.

DOUBLE-ENDER LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9–L	10–L	11–L	12–L	13–L			
Cylinders, Diameter	9″	10″	11″	12″	13″			
" Stroke	14″	16″	16″	18″	18″			
Diameter of Driving Wheels	30″ to 33″	33″ to 36″	33″ to 36″	36″ to 40″	36″ to 40″			
" Truck Wheels	20″	22″ to 24″	22″ to 24″	24″	24″			
Wheel Base, Rigid	4′ 0″	4′ 3″	4′ 6″	4′ 9″	5′ 0″			
" " Total	18′ 9″	20′ 6″	21′ 9″	23′ 0″	24′ 1″			
Length of Engine without Pilot	24′ 1″	26′ 0″	27′ 6″	29′ 0″	30′ 1″			
" " with Pilot	28′ 1″	30′ 6″	32′ 0″	34′ 0″	35′ 1″			
Weight, Loaded, Total	33,000 lbs.	38,000 lbs.	43,000 lbs.	48,500 lbs.	54,000 lbs.			
" " on Drivers	20,000 "	24,000 "	28,000 "	33,000 "	38,000 "			
" " on Truck	13,000 "	14,000 "	15,000 "	15,500 "	16,000 "			
Capacity of Tank	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.			
Hauling Capacity on Level	450 tons.	550 tons.	650 tons.	775 tons.	900 tons.			
" " 20 ft. Grade	220 "	265 "	315 "	375 "	435 "			
" " 40 ft. "	145 "	180 "	210 "	250 "	290 "			
" " 60 ft. "	110 "	130 "	155 "	185 "	215 "			
" " 80 ft. "	85 "	105 "	125 "	150 "	170 "			
" " 100 ft. "	70 "	85 "	105 "	125 "	145 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

DOUBLE-ENDER LOCOMOTIVE.

CLASS L.

The "Double-Ender" Locomotive is a type of engine well adapted to suburban service or switching, and is suitable for elevated as well as surface roads.

The tank is placed over the rear truck, and the variation in the quantity of fuel and water in service affects the adhesion of the driving wheels but slightly. The leading truck has a swing bolster and radius bar, allowing the engine to curve freely. The engine has great adhesion in proportion to its total weight, runs steadily and equally well in either direction, and does not require turning around. These qualities are highly important in an accelerated service in which rapid preparation, convenience, power, frequent stopping and quick starting are necessary.

On the following page we give the usual specifications.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger sizes double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

ENGINE TRUCK.—Swing bolster, with chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

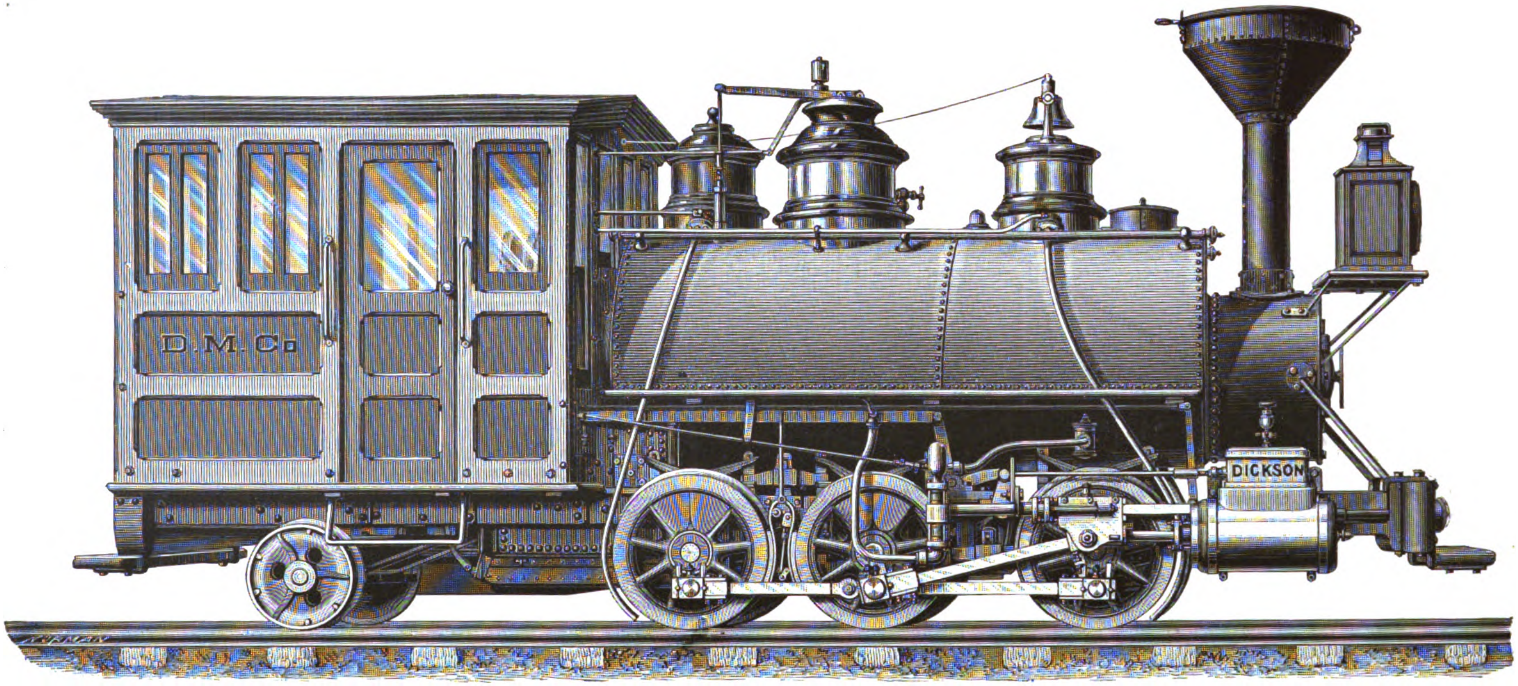
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED TANK ENGINE—WITH TRAILING TRUCK.

CLASS M.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED TANK ENGINE—WITH TRAILING TRUCK.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—M	10—M	11—M	12—M	13—M	14—M		
Cylinders, Diameter	9″	10″	11″	12″	13″	14″		
“ Stroke	14″	16″	16″	18″	18″	18′		
Diameter of Driving Wheels	28″ to 30″	30″ to 33″	33″ to 36″	36″ to 40″	36″ to 40″	36″ to 40″		
“ Truck Wheels	20″	20″ to 22″	22″ to 24″	24″	24″	24″		
Wheel Base, Rigid	6′ 6″	6′ 9″	7′ 0″	7′ 6″	8′ 0″	8′ 6″		
“ “ Total	13′ 6″	14′ 0″	14′ 9″	15′ 6″	16′ 0″	17′ 0″		
Length of Engine without Pilots	22′ 6″	23′ 6″	24′ 6″	25′ 6″	26′ 3″	27′ 3″		
“ “ with “	26′ 6″	28′ 0″	29′ 6″	31′ 0″	31′ 9″	32′ 9″		
Weight, Loaded, Total	29,000 lbs.	34.000 lbs.	39,000 lbs.	45,000 lbs.	51,000 lbs.	57,000 lbs.		
“ “ on Drivers	22,000 “	26,000 “	30,000 “	35,000 “	40,000 “	45,000 “		
“ “ on Truck	7,000 “	8,000 “	9,000 “	10,000 “	11,000 “	12,000 “		
Capacity of Tank	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.		
Hauling Capacity on Level	500 tons.	600 tons.	700 tons.	825 tons.	950 tons.	1,075 tons.		
“ “ 20 ft. Grade	240 “	290 “	340 “	400 “	460 “	520 “		
“ “ 40 ft. “	160 “	195 “	225 “	265 “	310 “	350 “		
“ “ 60 ft. “	120 “	145 “	170 “	200 “	230 “	260 “		
“ “ 80 ft. “	95 “	115 “	135 “	155 “	180 “	205 “		
“ “ 100 ft. “	80 “	95 “	110 “	130 “	150 “	170 “		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

TANK SWITCHING ENGINE.

CLASS M.

We give particulars of several sizes of this class of Switching Engine, which has six wheels coupled and a trailing two-wheeled truck. The tank is placed either over the boiler, as shown in the engraving, or over the truck.

The locomotive is designed for switching about depots and stations, or for logging or plantation service. The rear truck, which is used whether the tank is on the boiler or not, is of the swing-bolster, radius-bar kind, and permits the engine to pass around curves with safety, and increases its steadiness.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—of charcoal iron or cast steel

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes, cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron, if required.

TANK.—Mounted on top of boiler or over truck.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED

SWITCHING OR LOGGING TANK ENGINE,

WITH LEADING AND TRAILING TWO-WHEELED TRUCKS.

CLASS N.

NARROW GAUGE. FUEL, COAL OR WOOD.

SIX WHEELS COUPLED SWITCHING OR LOGGING TANK ENGINE,

WITH LEADING AND TRAILING TWO-WHEELED TRUCKS.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—N	10—N	11—N	12—N	13—N	14—N		
Cylinders, Diameter	9″	10″	11″	12″	13″	14″		
" Stroke	14″	16″	16″	18″	18″	18″		
Diameter of Driving Wheels	28″ to 30″	30″ to 33″	33″ to 36″	36″ to 40″	36″ to 40″	36″ to 40″		
" Truck Wheels	20″ to 22″	22″ to 24″	24″	24″	24″	24″		
Wheel Base, Rigid	6′ 6″	6′ 9″	7′ 0″	7′ 6″	8′ 0″	8′ 6″		
" " Total	16′ 8″	17′ 10½″	18′ 9″	19′ 9″	20′ 7″	21′ 4″		
Length of Engine without Pilots	24′ 3″	25′ 3″	27′ 3″	28′ 3″	29′ 3″	30′ 3″		
" " with One Pilot	28′ 3″	29′ 9″	32′ 3″	33′ 9″	34′ 9″	35′ 9″		
Weight, Loaded, Total	33,000 lbs.	38,000 lbs.	43,000 lbs.	48,000 lbs.	54,000 lbs.	60,000 lbs.		
" " on Drivers	22,000 "	26,000 "	30,000 "	34,000 "	39,000 "	44.000 "		
" " on Trucks	11,000 "	12,000 "	13,000 "	14,000 "	15,000 "	16,000 "		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level*	500 tons.	600 tons.	700 tons.	800 tons.	925 tons.	1,050 tons.		
" " 20 ft. Grade	240 "	290 "	340 "	385 "	450 "	510 "		
" " 40 ft. "	160 "	195 "	225 "	260 "	300 "	345 "		
" " 60 ft. "	120 "	145 "	170 "	190 "	220 "	250 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	175 "	200 "		
" " 100 ft. "	80 "	95 "	110 "	125 "	145 "	165 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

DOUBLE-ENDER SWITCHING ENGINE.

CLASS N.

The class "N" narrow-gauge general service or logging engine has all of the features possessed by the class "M" engine, with the additional one of a leading truck. On account of this feature it may be preferred to class "M," as it will curve in a forward direction somewhat better.

The remarks made with reference to class "M" apply to this engine.

General specifications are given on the next page.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams of the larger sizes double riveted. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, as required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron, if required.

TANK.—Mounted on top of boiler or over truck.

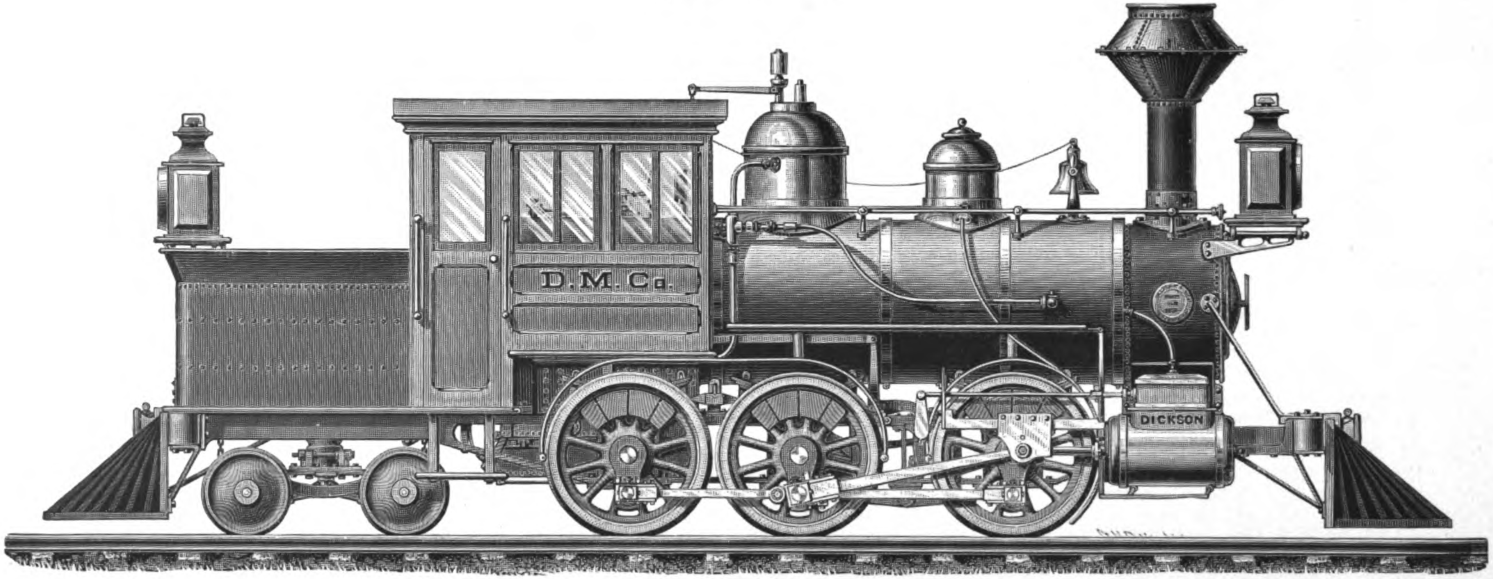
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools and set of oil cans.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; gauge lamp, and all necessary oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

CLASS O.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—O	10—O	11—O	12—O	13—O	14—O		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16"	16"	18"	18"	18"		
Diameter of Driving Wheels	28" to 30"	30" to 33"	33" to 36"	36" to 40"	36" to 40"	36" to 40"		
" Truck Wheels	20" to 22"	22" to 24"	22" to 24"	24"	24"	24"		
Wheel Base, Rigid	6' 6"	6' 9"	7' 0"	7' 6"	8' 0"	8' 6"		
" " Total	14' 3"	15' 3"	16' 0"	17' 3"	18' 3"	19' 3"		
Length of Engine without Pilots	22' 9"	24' 3"	25' 6"	27' 0"	28' 3"	29' 6"		
" " with Pilots	26' 9"	28' 9"	30' 6"	32' 6"	33' 9"	35' 0"		
Weight, Loaded, Total	32,000 lbs.	37,000 lbs.	42,000 lbs.	47,000 lbs.	53,000 lbs.	59,000 lbs.		
" " on Drivers	24,000 "	28,000 "	32,000 "	36,000 "	41,000 "	46,000 "		
" " on Truck	8,000 "	9,000 "	10,000 "	11,000 "	12,000 "	13,000 "		
Capacity of Tank	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.	700 gal.		
Hauling Capacity on Level	550 tons.	650 tons.	750 tons.	850 tons.	975 tons.	1,100 tons.		
" " 20 ft. Grade	265 "	315 "	365 "	410 "	460 "	530 "		
" " 40 ft. "	180 "	210 "	245 "	275 "	315 "	355 "		
" " 60 ft. "	120 "	155 "	180 "	205 "	235 "	265 "		
" " 80 ft. "	105 "	125 "	145 "	160 "	185 "	210 "		
" " 100 ft. "	85 "	105 "	120 "	135 "	155 "	175 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED "FORNEY" TANK LOCOMOTIVE.

CLASS O.

The class "O" locomotive is a very powerful type of engine for its weight, and is designed for service where frequent stops are necessary with heavy loads, and therefore where it will be possible to take water often. The tank is made small in order to keep down the dead weight of the engine and to shorten the wheel base. Although this engine is intended to be run in either direction, and is often so used, it will be found to "track" better and to diminish the wear of flanges if it is run backwards. It, however, runs steadily at all times, and is perfectly free from plunging. The position of the cab renders the engine remarkably easy riding.

The driving wheels are all equalized together, thus giving great vertical flexibility of wheel base. The truck is center bearing, and provided with a swing bolster.

We add general specifications.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, with all wearing parts bushed and case hardened; rocker shafts and lifting shafts of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

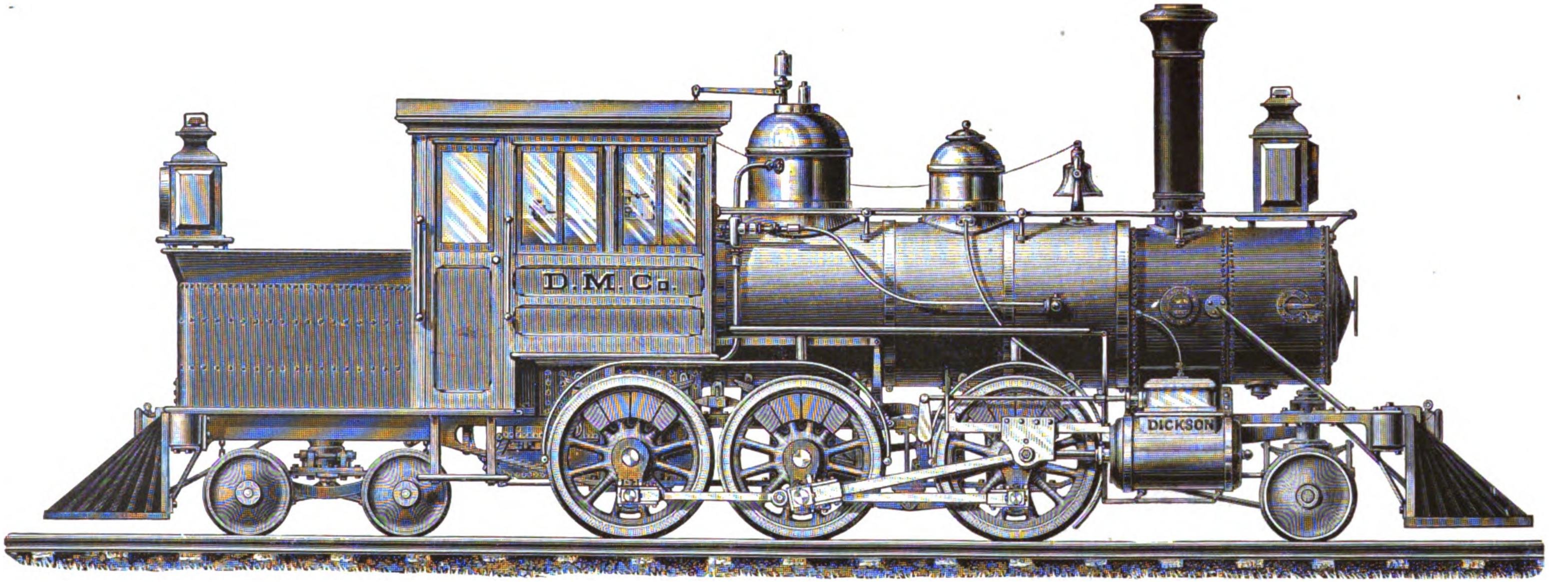
TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

CLASS P.



NARROW GAUGE.

FUEL, COAL OR WOOD.

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—P	10—P	11—P	12—P	13—P	14—P		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16'	16"	18"	18"	18"		
Diameter of Driving Wheels	28" to 30"	30" to 33'	33' to 36"	36" to 40"	36" to 40"	36" to 40'		
" Truck Wheels	20" to 22"	22" to 24'	22" to 24"	24"	24"	24"		
Wheel Base, Rigid	6' 6"	6' 9"	7' 0"	7' 6"	8' 0"	8' 6"		
" " Total	19' 2"	20' 7½"	21' 6"	23' 0"	24' 1"	25' 1"		
Length of Engine without Pilots	24' 6"	26' 3"	27' 6"	29' 3"	30' 6"	31' 9"		
" " with Pilots	28' 6"	30' 9"	32' 6"	34' 9"	36' 0'	37' 3"		
Weight Loaded, Total	35,000 lbs.	40,000 lbs.	45,000 lbs.	50,000 lbs.	56,000 lbs.	62,000 lbs.		
" " on Drivers	22,000 "	26,000 "	30,000 "	34,000 "	39,000 "	44,000 "		
" " on Truck	13,000 "	14,000 "	15,000 "	16,000 "	17,000 "	18,000 "		
Capacity of Tank	450 gal.	500 gal.	550 gal.	600 gal.	650 gal.	700 gal.		
Hauling Capacity on Level	500 tons.	600 tons.	700 tons	800 tons.	925 tons.	1,050 tons.		
" " 20 ft. Grade	240 "	290 "	340 "	385 "	450 "	510 "		
" " 40 ft. "	160 "	195 "	225 "	260 "	300 "	345 "		
" " 60 ft. "	120 "	145 "	170 "	190 "	220 "	250 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	175 "	200 "		
" " 100 ft. "	80 "	95 "	110 "	125 "	145 "	165 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

SIX WHEELS COUPLED DOUBLE-ENDER LOCOMOTIVE.

CLASS P.

The class "P" locomotive is offered as an excellent type of engine to conduct any heavy traffic in which stops and opportunities to take water are frequent. The tank is placed over the rear truck, and is made small in order to keep down the dead weight and to shorten the wheel base. It will be found to "track" well in either direction, and will not require turning around.

The pony truck is provided with a swing bolster and radius bar, and is equalized with the front pair of driving wheels, the latter being equalized with each other. This arrangement gives great vertical flexibility to the wheel base, and the engine will ride smoothly over the poorest tracks. The rear truck is, like the pony truck, provided with a swing bolster. The engine is remarkably comfortable to the engineer, from the position of the cab; and for branch freight or mixed service, or, as indicated above, for any service where there are short runs and frequent stops necessitating power and quick starting, the performance will be in every way satisfactory.

Specifications follow.

GENERAL SPECIFICATIONS.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted. Fire box of steel, flues of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles, if required; axle boxes of cast iron with brass bearings; crank pins of steel.

CAB—Of hard wood with plate-glass windows.

PILOTS—Of hard wood or wrought iron.

TANK.—Mounted on main frames in rear of boiler; truck wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

LOGGING and PLANTATION LOCOMOTIVES

LOGGING & PLANTATION LOCOMOTIVES.

Having had considerable experience in building locomotives specially designed for logging and plantation service, THE DICKSON MANUFACTURING COMPANY offer in the following pages descriptions of a number of classes of locomotives for such services. They are built of various gauges, and the same care and methods are used in their construction that characterize our general locomotive practice.

HAULING CAPACITIES.

The hauling capacities given in the tables are estimated for cars equal in quality to those found in the average "American" standard practice, the track being straight, and the rails and cars being in good condition. But as logging and plantation railroads and rolling stock are generally not in good condition, and as sometimes wooden rails are used, an allowance of from 25 to 75 per cent. of the given capacities must be made according to circumstances, particularly if the lines have much curvature.

KIND AND WEIGHT OF RAILS.

We recommend the exclusive use of steel rails for logging and plantation roads, as they are more satisfactory than any other kind from all points of view, and are at present very cheap. They need not weigh more than thirty pounds, and should not weigh much less than twenty pounds, per yard.

Wooden rails are very difficult to keep in repair unless the locomotives are extremely light. The traction on them is but little more than one-half that upon steel rails, while the resistance to the cars is excessive, and in winter wooden rails are very slippery.

If it should be advisable in any case to use wooden rails, we recommend maple laid with the heart uppermost; but in the South hard pine can be used. The best size of wooden rails is about five inches wide by six or more inches deep. With such rails the cross-ties may be laid three or four feet apart. Where a proper kind of wood is expensive, it can be used only for facing a stringer of inferior wood. The facing strip can be five inches wide by three inches thick. The stringers can be made as heavy as desirable, and the cross ties farther apart than would otherwise be the case—as much as seven or eight feet. If the ties are placed as far apart as this, there should be supplementary ties placed on top of the stringers at closer intervals to prevent them from springing, and this should be done before the facing strips are spiked down.

A facing strip of strap iron may be used, but this is a very poor arrangement, as it curls up and pulls out spikes. It is far better to use a very light T-rail.

GENERAL SPECIFICATIONS OF LOCOMOTIVES.

BOILER.—Made of best cold-blast charcoal plate iron, or all-guaranteed steel plate if required; longitudinal seams double riveted for the larger sizes. Fire box of steel, tubes of best wrought iron set with copper ferrules at both ends; one steam dome fitted with balanced throttle valve; one steam whistle and two safety valves; feed water supplied with one pump and one injector (or two injectors if required); boiler furnished with steam gauge, blow-off cock, gauge cocks and blower valve, and covered with pine lagging and planished iron jacket.

CYLINDERS.—Made of close-grained charcoal iron, as hard as can be worked, outside connected, horizontal, bolted together in center, right and left hand interchangeable, heads, sides and steam chest furnished with iron casings.

PISTONS.—Steel rods, cast-iron heads and followers; packing rings of cast iron or brass.

CROSS HEADS—Of charcoal iron or cast steel.

GUIDE BARS—Of steel, or case-hardened iron, secured to wrought-iron yoke and cylinder head.

CONNECTING RODS.—Best quality hammered iron; boxes of best quality hard brass, lined with babbitt metal.

VALVE MOTION.—Shifting links of hammered iron, case hardened, with all wearing parts bushed and case hardened; rocker shafts and lifting shaft of wrought iron, with solid arms; cast-iron slide valves of the usual pattern.

DRIVING WHEELS.—Cast-iron centers; steel tires; hammered iron or steel axles as required; axle boxes of cast iron with brass bearings; crank pins of steel.

TRUCK.—Swing bolster, with radius bar; chilled wheels; hammered iron axles; cast-iron axle boxes with brass bearings.

CAB—Of hard wood with plate-glass windows.

PILOT—Of hard wood or wrought iron.

TANK.—Mounted on top of boiler, or on either an oak or an iron frame, with four wheels, or two four-wheeled trucks; wheels double plate, chilled face; hammered iron axles with brass bearings.

TOOLS.—A complete set of iron and steel wrenches, one screw wrench, two chisels, hard and soft hammers, two jack screws, one pinch bar, and complete set of fire tools.

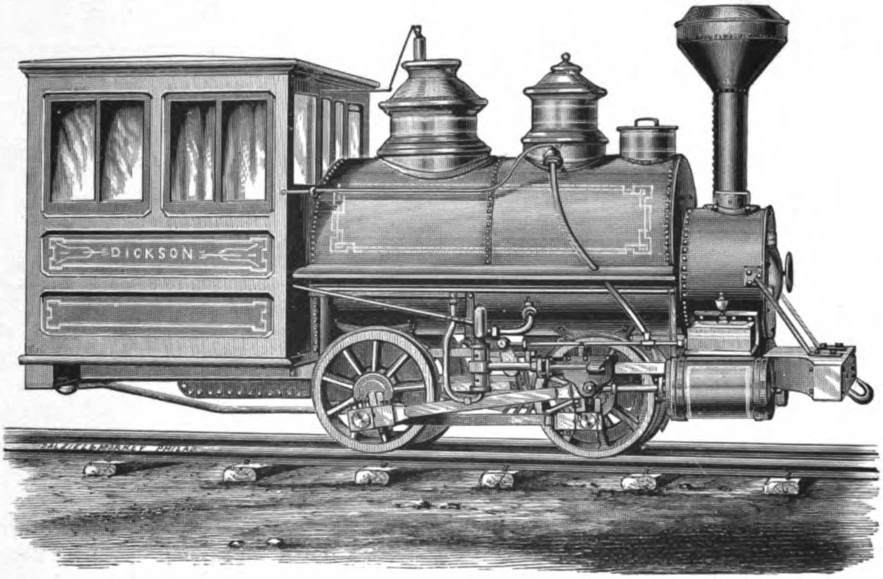
MOUNTING, &c.—Running boards and hand rails on each side; one bell and frame; one sand box; brackets and shelf for head light; signal gong; steam gauge lamp, and all necessary oil cans and oil cups.

PAINTING.—Engine neatly painted and varnished, and lettered and numbered to suit the purchaser.

TANK LOCOMOTIVE.

For Outside Mine Service, Furnace Use or Logging Service.

CLASS A.



NARROW GAUGE.

Fuel, Coal or Wood.

TANK LOCOMOTIVE—FOR OUTSIDE MINE SERVICE, ETC.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS.	6—A	7—A	8—A	9—A	9—A	10—A	11—A	12—A
Cylinders, Diameter	6"	7"	8"	9"	9"	10"	11"	12"
" Stroke	10"	10"	12"	12"	16"	16"	16"	18"
Diameter of Driving Wheels	22"	24½"	26½"	29"	36"	36"	36"	36"
Wheel Base	3' 0"	4'	4' 3"	4' 6"	5' 6"	6'	6'	6' 3"
Gauge of Track	30" and up	30" and up	30" and up	30" and up	33" and up	36" and up	36" and up	36" and up
Extreme Width, more than Gauge	26"	28"	30"	36"	36"	42"	42"	44"
Extreme Height from Rail	5' 0"	7' 6"	8'	8' 10"	10'	10' 3"	10' 6"	11' 3"
Length, over all	11' 6"	14' 10"	16'	17' 10"	20'	21'	21' 9"	22' 10"
Weight, loaded for service	10,000 lbs.	13,000 lbs.	16,000 lbs.	20,000 lbs.	23,000 lbs.	28,000 lbs.	33,000 lbs.	38,000 lbs.
Capacity of Tank	120 gal.	200 gal.	220 gal.	260 gal.	400 gal.	400 gal.	450 gal.	500 gal.
Hauling Capacity on Level*	200 tons.	275 tons.	350 tons.	450 tons.	525 tons.	650 tons.	775 tons.	900 tons.
" " 20 ft. Grade	95 "	130 "	165 "	215 "	250 "	315 "	375 "	435 "
" " 40 ft. "	65 "	85 "	110 "	145 "	170 "	210 "	250 "	290 "
" " 60 ft. "	45 "	65 "	80 "	105 "	125 "	155 "	185 "	215 "
" " 80 ft. "	35 "	50 "	65 "	85 "	100 "	120 "	145 "	170 "
" " 100 ft. "	30 "	40 "	55 "	70 "	80 "	100 "	120 "	140 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

The price quoted is on cars at Scranton and for a locomotive of the gauge and weight given in the table. To increase the gauge of either class would increase the weight and price.

* See page 193.

TANK LOCOMOTIVE.

FOR OUTSIDE MINE SERVICE, FURNACE USE OR LOGGING SERVICE.

These locomotives are especially designed for shifting and for short runs and heavy service about the outside of mines, for working about blast furnaces, rolling mills and large manufacturing establishments generally. They are also peculiarly fitted for service on light suburban railroads. The front drivers are equalized across, causing an easy motion and smooth working on uneven track, heavy grades and sharp curves.

In order to substantiate our claims for these locomotives, we would refer buyers to a careful study of the illustration, showing the general design of the engine, and to an investigation of the records of engines already in service.

Record of Dickson Locomotive owned by Pierce Coal Co., Winton, Pa.

CLASS 9—A. CYLINDERS, 9x12. GAUGE, 36" WEIGHT, 20,000 lbs.

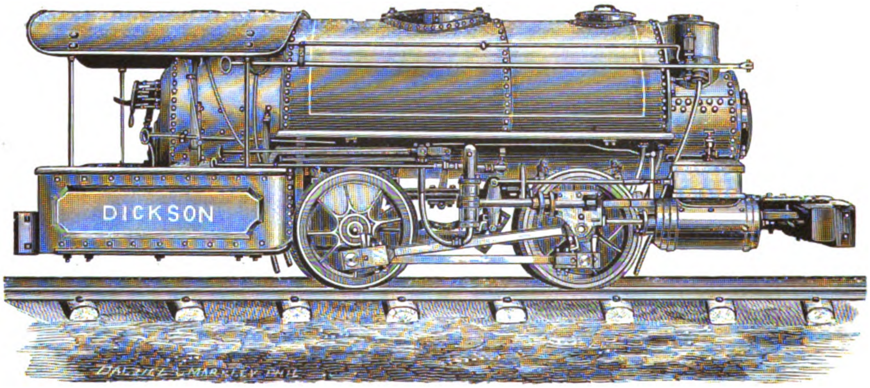
ONE DAY'S WORK.—Eleven trains of twenty cars each, pulled three miles up an average grade of 140 feet per mile. Maximum grade, 258 feet per mile. Maximum curvature, 30 feet radius. Weight of one empty car, 2,100 pounds; of train of twenty cars, 42,000 pounds. Total miles run by engine, 66 in ten hours. Coal burned, 3,000 pounds. Water evaporated, 2,145 gallons. Oil used on engine, three pints (all kinds). Crew consists of engineer, fireman and one brakeman.

Two mules can make two round trips per day, pulling two cars. To do the work of the engine and three men would require fifty-six mules and twenty-eight drivers.

TANK LOCOMOTIVE.

For Inside Mine Service.

CLASS A.



NARROW GAUGE.

Fuel, Coal or Wood.

TANK LOCOMOTIVE—FOR INSIDE MINE SERVICE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF EIGHT SIZES OF THIS CLASS.

CLASS.	6—A	7—A	8—A	9—A	9—A	10—A	11—A	12—A
Cylinders, Diameter	6′	7″	8″	9″	9″	10″	11″	12″
" Stroke	10″	10″	12″	12″	16″	16″	16″	18″
Diameter of Driving Wheels	22″	24″	26½″	29″	36″	36″	36″	36″
Wheel Base	3′ 0″	4′	4′ 3″	4′ 6″	5′ 6″	6′	6′	6′ 3″
Gauge of Track	30″ and up	30″ and up	30″ and up	30″ and up	33″ and up	36″ and up	36″ and up	36″ and up
Extreme Width, more than Gauge	26″	28′	30″	36′	36″	42″	42′	44″
Extreme Height from Rail	5′ 0″	5′ 3″	5′ 6″	6′	6′ 9″	7′	7′ 6″	7′ 9″
Length, over all	11′ 6″	14′ 10″	16′	17′ 10″	20′	21′	21′ 9″	22′ 10″
Weight, loaded for service	10,000 lbs.	13,000 lbs.	16,000 lbs.	20,000 lbs.	23,000 lbs.	28,000 lbs.	33,000 lbs.	38,000 lbs.
Capacity of Tank	120 gal.	200 gal.	220 gal.	260 gal.	400 gal.	400 gal.	450 gal.	500 gal.
Hauling Capacity on Level *	200 tons.	275 tons.	350 tons.	450 tons.	525 tons.	650 tons.	775 tons.	900 tons.
" " 20 ft. Grade	95 "	130 "	165 "	215 "	250 "	315 "	375 "	435 "
" " 40 ft. "	65 "	85 "	110 "	145 "	170 "	210 "	250 "	290 "
" " 60 ft. "	45 "	65 "	80 "	105 "	125 "	155 "	185 "	215 "
" " 80 ft. "	35 "	50 "	65 "	85 "	100 "	120 "	145 "	170 "
" " 100 ft. "	30 "	40 "	55 "	70 "	80 "	100 "	120 "	140 "
Prices ready for service at works in Scranton	$	$	$	$	$	$	$	$

The price quoted is on cars at Scranton and for a locomotive of the gauge and weight given in the table. To increase the gauge of either class would increase the weight and price.

*See page 198.

TANK LOCOMOTIVE.

FOR INSIDE MINE SERVICE.

They are peculiarly adapted for working inside of mines, and combine in their design and construction all the points of excellence derived from a large experience in building locomotives for general and special service. Convenience in handling, simplicity, perfection of necessary appliances, compactness of design, maximum power and neatness of finish recommend them for the peculiar work required of them. A short wheel base, even distribution and equalization of weight, smooth and easy working in all positions, commend them for working on heavy grades, sharp curves, and in limited space.

In order to substantiate our claims for these locomotives, we would refer buyers to a careful study of the illustration, showing the general design of the engine, and to an investigation of the records of engines already in service.

Record of Dickson Locomotive owned by Pierce Coal Co., Winton, Pa.

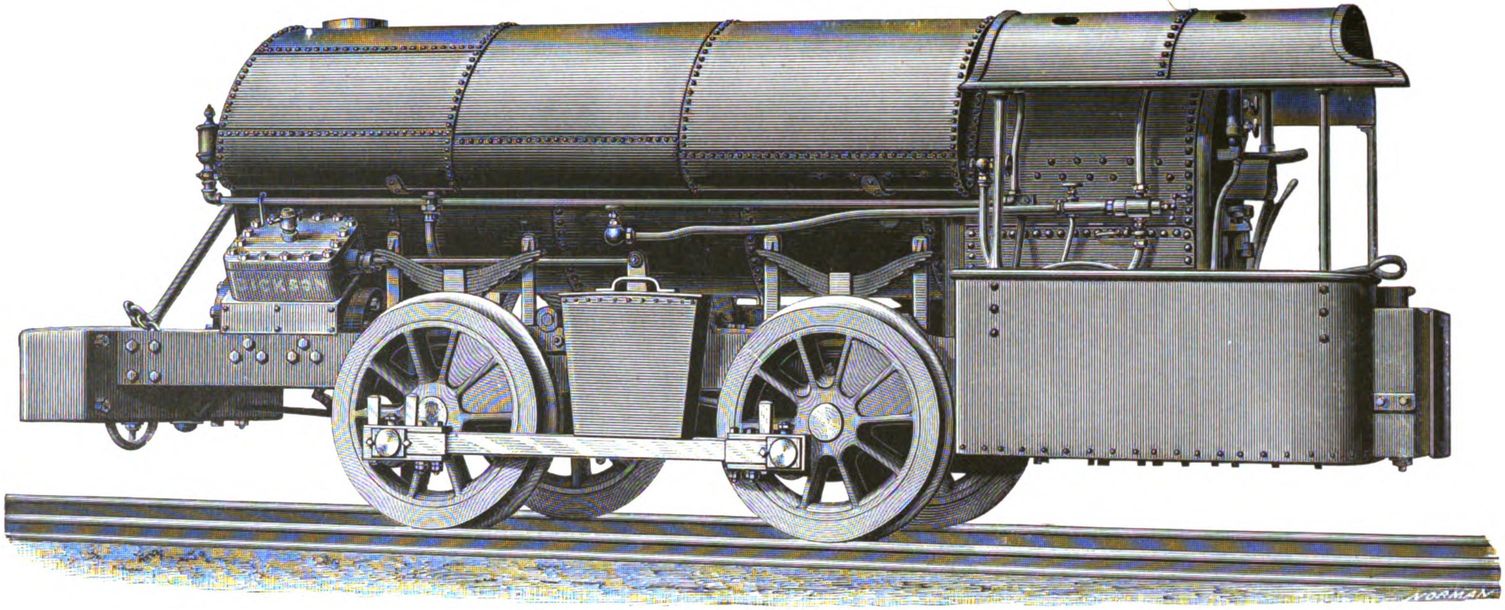
CLASS 9—A. CYLINDERS, 9x12. GAUGE, 36″. WEIGHT, 20,000 lbs.

ONE DAY'S WORK.—Eleven trains of twenty cars each, pulled three miles up an average grade of 140 feet per mile. Maximum grade, 258 feet per mile. Maximum curvature, 30 feet radius. Weight of one empty car, 2,100 pounds; of train of twenty cars, 42,000 pounds. Total miles run by engine, 66 in ten hours. Coal burned, 3,000 pounds. Water evaporated, 2,145 gallons. Oil used on engine, three pints (all kinds). Crew consists of engineer, fireman and one brakeman.

Two mules can make two round trips per day, pulling two cars. To do the work of the engine and three men would require fifty-six mules and twenty-eight drivers.

INSIDE CONNECTED MINE LOCOMOTIVE—FOR INSIDE SERVICE.

CLASS A.



GAUGE, 36 INCHES AND UPWARD.

FUEL, COAL OR WOOD.

Inside Connected Mine Locomotive.

FOR INSIDE SERVICE.

GAUGE, 36 Inches and upwards. FUEL, Coal or Wood.

TABLE OF SIZES AND HAULING CAPACITIES OF THREE SIZES OF THIS CLASS.

CLASS	**8-A**	**9—A**	**10—A**	
Cylinders, Diameter	8″	9″	10″	
“ Stroke	12″	12″	13″	
Diameter Driving Wheels	28″	29″	30″	
Wheel Base	3′ 10″	4′ 0″	4′ 3″	
Gauge of Track	36″ or more	36″ or more	36″ or more	
Extreme Width more than Gauge	16″	16″	18″	
Extreme Height from Rail	5′ 4″	5′ 8″	6′ 0″	
Length over all	15′ 0″	15′ 9″	16′ 9″	
Weight, Loaded for Service	12,000 lbs.	15,000 lbs.	18,000 lbs.	
Capacity of Tank	220 gals.	250 gals.	300 gals.	
Hauling Capacity on Level*	275 tons.	325 tons.	400 tons.	
“ “ 20 ft. per mile Grade	130 “	155 “	190 “	
“ “ 40 “ “	85 “	105 “	130 “	
“ “ 60 “ “	65 “	75 “	95 “	
“ “ 80 “ “	50 “	60 “	75 “	
“ “ 100 “ “	40 “	50 “	60 “	
Prices ready for service at works in Scranton				

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* See page 193.

INSIDE CONNECTED MINE LOCOMOTIVE.

CLASS A.

FOR INSIDE SERVICE.

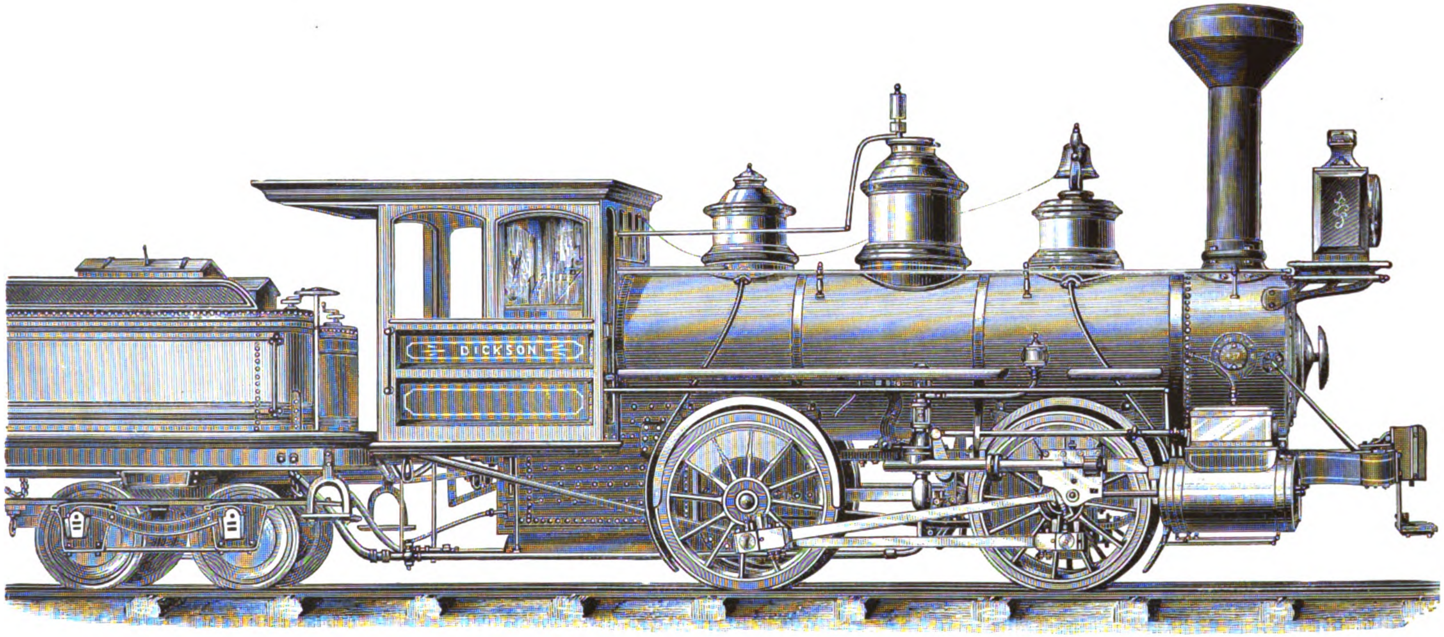
These engines are peculiarly adapted for working inside of mines. They combine in their design and construction all the points of excellence derived from a large experience in building locomotives for general and special service. Convenience in handling, simplicity, perfection of necessary appliances, compactness of design, maximum power and neatness of finish, recommend them for the peculiar work required of them. A short wheel base, even distribution and equalization of weight, smooth and easy working in all positions, commend them for working on heavy grades, sharp curves, and in limited space.

The width over all of the inside connected locomotive is but little if any greater than that over the outside crank pins, so that this type of engine is particularly serviceable in openings so narrow that outside cylinders will not clear. They are necessarily a little higher than outside connected engines, for obvious reasons. Every effort is made to produce a long-lived crank axle, such as the selection of the most suitable material, careful manipulation, and large fillets at the bends.

In order to substantiate our claims for these locomotives, we would refer buyers to a careful study of the illustration, showing the general design of the engine, and to an investigation of the records of engines already in service.

FOUR WHEELS COUPLED LOCOMOTIVE—WITH TENDER.

CLASS A.



NARROW GAUGE.

FUEL, COAL OR WOOD.

CLASS "A" LOCOMOTIVE—WITH TENDER.

GAUGE, 30 INCHES AND WIDER. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS A...	9—A	10—A	11—A	12—A	13—A			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
Wheel Base of Engine	5' 0"	5' 6"	6' 0"	6' 3"	6' 6"			
" " " and Tender	20' 7"	21' 4"	26' 3"	27' 2"	29' 2"			
Length of " " "	28' 10"	29' 10"	34' 3"	35' 9"	38' 0"			
Weight Loaded for Service	20,000 lbs.	24,000 lbs.	28,000 lbs.	33,000 lbs.	38,000 lbs.			
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,250 gal.			
Number of Wheels under Tender	4	4	8	8	8			
Hauling Capacity on Level *	490 tons.	590 tons.	685 tons.	810 tons.	985 tons.			
" " 20 ft. Grade	230 "	280 "	325 "	385 "	445 "			
" " 40 ft. "	150 "	185 "	210 "	250 "	295 "			
" " 60 ft. "	110 "	135 "	155 "	175 "	215 "			
" " 80 ft. "	85 "	105 "	120 "	140 "	165 "			
" " 100 ft. "	70 "	85 "	95 "	115 "	135 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

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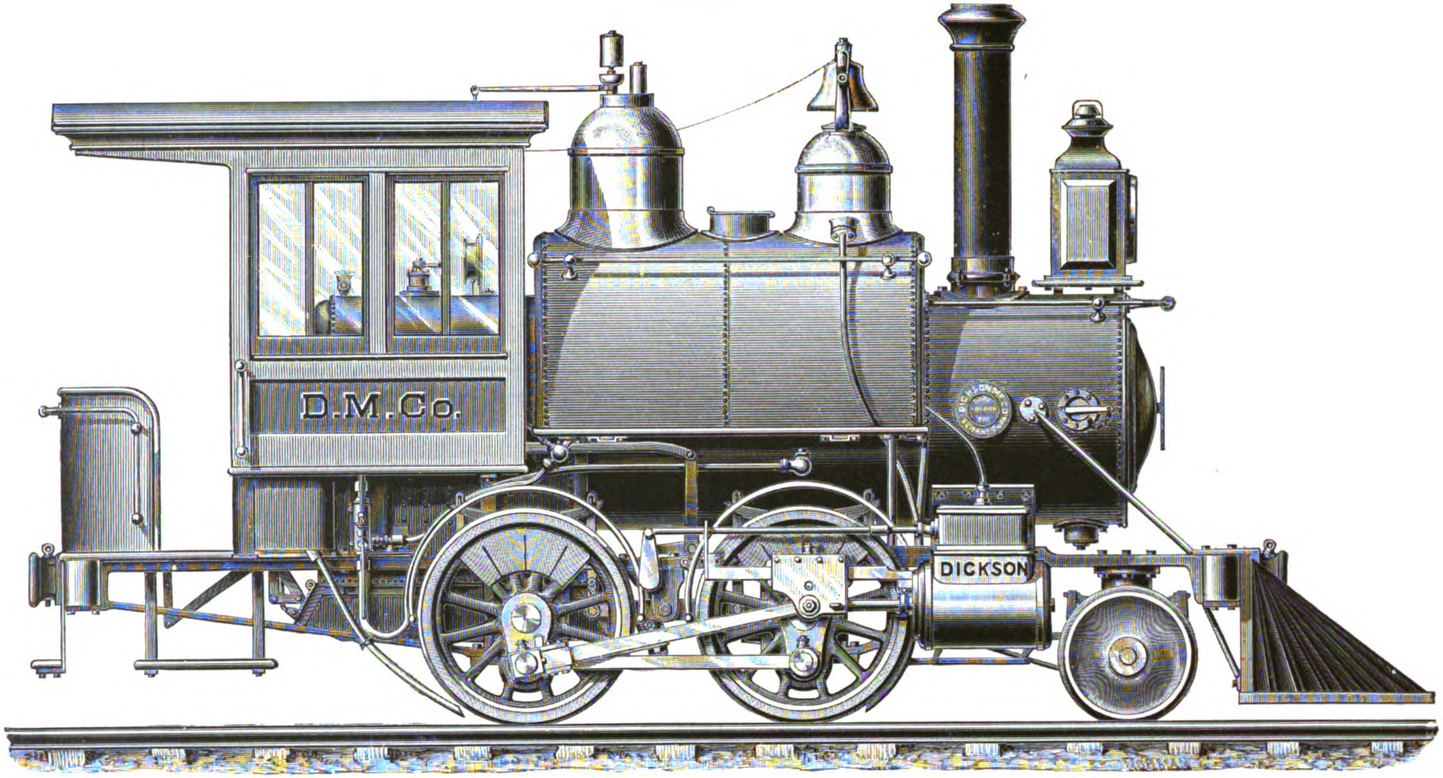
* See page 193.

CLASS "A" LOCOMOTIVE.

The class "A" locomotive, of which we give particulars on the preceding page, can be used with satisfaction for logging or plantation service. The weight is equally distributed among the four driving wheels, and the forward springs are equalized across the engine and causes it to ride easy.

TANK LOCOMOTIVE—WITH LEADING TRUCK.

CLASS B.



FUEL, COAL OR WOOD.

CLASS "B" TANK LOCOMOTIVE.

GAUGE, 36 INCHES AND WIDER. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9—B	10—B	11—B	12—B	13—B			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
" Truck Wheels	20"	22" to 24"	22" to 24"	24"	24"			
Wheel Base, Rigid	4' 0"	4' 3"	4' 6"	4' 9"	5' 0"			
" " Total	8' 11"	9' 8"	10' 0"	10' 6"	10' 10"			
Length of Engine	18' 3"	19' 6"	20' 3"	21' 0"	21' 9"			
Weight Loaded, Total	26,000 lbs.	31,000 lbs.	36,000 lbs.	42,000 lbs.	48,000 lbs.			
" " on Drivers	22,000 "	26,000 "	30,000 "	35,000 "	40,000 "			
" " on Truck	4,000 "	5,000 "	6,000 "	7,000 "	8,000 "			
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.			
Hauling Capacity on Level *	500 tons.	600 tons.	700 tons	825 tons.	950 tons.			
" " 20 ft. Grade	240 "	290 "	340 "	400 "	460 "			
" " 40 ft. "	160 "	195 "	225 "	265 "	310 "			
" " 60 ft. "	120 "	145 "	170 "	195 "	225 "			
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "			
" " 100 ft. "	80 "	95 "	110 "	130 "	150 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

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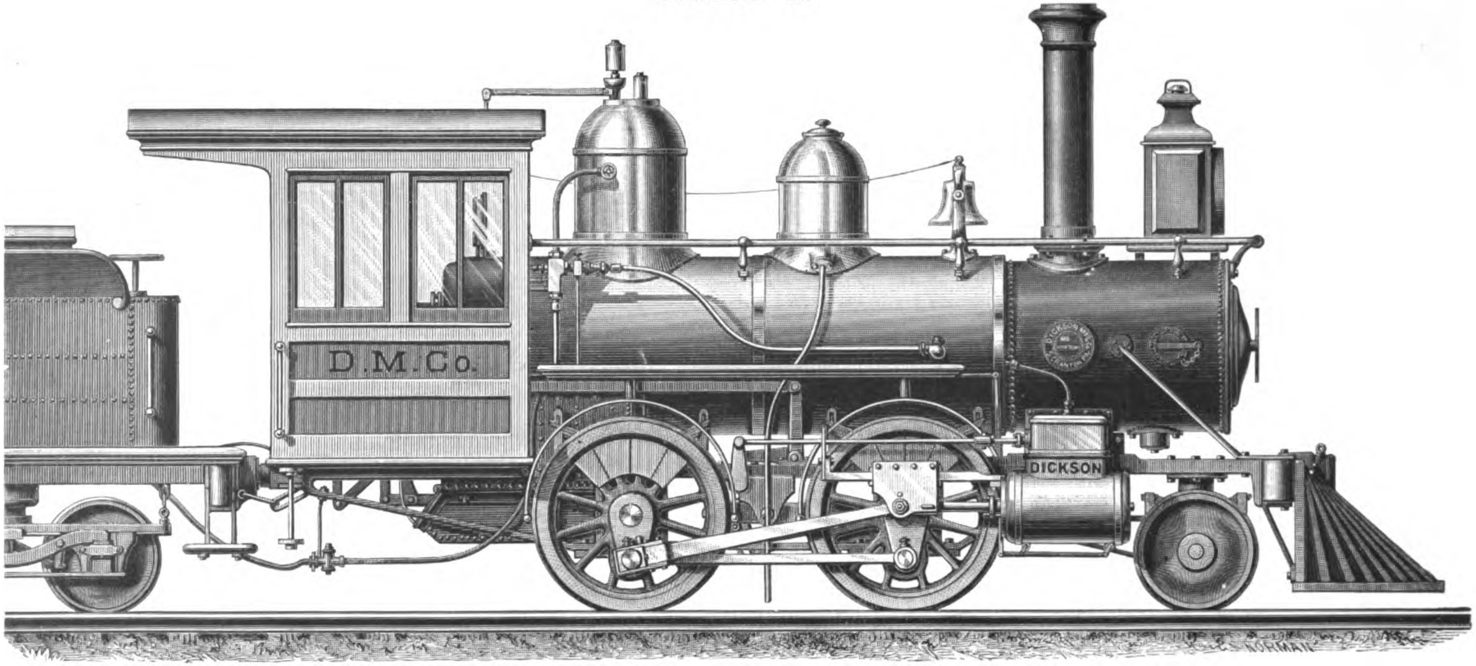
* See page 193.

LOCOMOTIVE—WITH TENDER.

CLASS B.



NARROW GAUGE.

FUEL, COAL OR WOOD.

CLASS "B" LOCOMOTIVE—WITH TENDER.

FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	9—B	10—B	11—B	12—B	13—B			
Cylinders, Diameter	9"	10"	11"	12"	13"			
" Stroke	14"	16"	16"	18"	18"			
Diameter of Driving Wheels	29" to 33"	33" to 36"	33" to 36"	36" to 40"	36" to 40"			
" Truck Wheels	20"	22" to 24"	22" to 24"	24"	24"			
Wheel Base, Rigid	4' 0"	4' 3"	4' 6"	4' 9"	5' 0"			
" " Total	8' 11"	9' 8"	10' 0"	10' 6"	10' 10"			
" " Engine and Tender	24' 6"	25' 6"	20' 1"	31' 4"	33' 6"			
Length of Engine and Tender	31' 10"	33' 3"	37' 0"	39' 0"	41' 3"			
Weight, Loaded, Total	22,000 lbs.	26,500 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.			
" " on Drivers	18,000 "	22,000 "	26,000 "	30,000 "	34,000 "			
" " on Truck	4,000 "	4,500 "	5,000 "	6,000 "	7,000 "			
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,250 gal.			
Hauling Capacity on Level *	440 tons.	540 tons.	635 tons.	735 tons.	835 tons.			
" " 20 ft. Grade	210 "	255 "	300 "	345 "	395 "			
" " 40 ft. "	135 "	170 "	195 "	225 "	260 "			
" " 60 ft. "	100 "	120 "	140 "	165 "	190 "			
" " 80 ft. "	75 "	95 "	110 "	125 "	145 "			
" " 100 ft. "	60 "	75 "	90 "	105 "	120 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

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* See page 193.

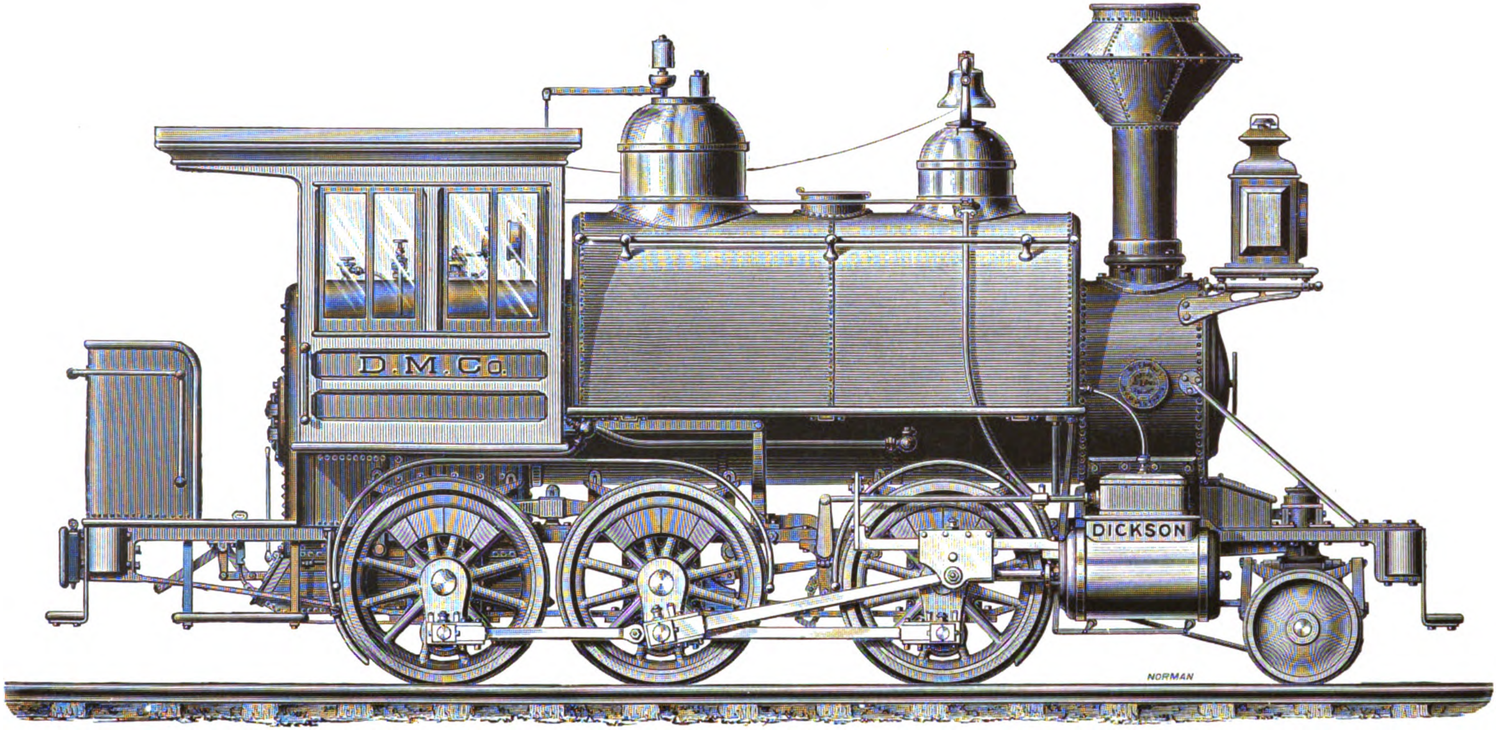
CLASS "B" LOCOMOTIVE.

The addition of the leading truck to the four wheels coupled engine contributes to its steadiness and diminishes plunging on a poor road. The truck is provided with a swing bolster and radius bar, and it is equalized with the forward pair of driving wheels.

The engine is provided with a tank on the boiler, or with a separate tender.

SIX WHEELS COUPLED LOCOMOTIVE—WITH LEADING TRUCK.

CLASS E.



NARROW GAUGE.

FUEL, COAL OR WOOD.

CLASS "E" TANK LOCOMOTIVE.

FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—E	10—E	11—E	12—E	13—E	14—E		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16"	16"	18"	18"	18'		
Diameter of Driving Wheels	28" to 30'	30" to 33'	33" to 36"	36" to 40"	36" to 40"	36" to 40"		
" Truck Wheels	20"	20" to 24"	20" to 24"	24"	24"	24"		
Wheel Base, Rigid	6' 4"	6' 8"	7' 0"	7' 6"	8' 0"	8' 6"		
" " Total	11' 4½"	12' 2"	12' 7"	13' 3"	13' 8"	14' 7"		
Length of Engine	19' 9"	21' 0"	21' 10"	22' 8"	23' 9"	24' 8"		
Weight, Loaded, Total	28,000 lbs.	33,000 lbs.	38,000 lbs.	43,000 lbs.	49,000 lbs.	55,000 lbs.		
" " on Drivers	22,000 "	26,000 "	30,000 "	35,000 "	40,000 "	45,000 "		
" " on Trucks	6,000 "	7,000 "	8,000 "	8,000 "	9,000 "	10,000 "		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level*	500 tons.	600 tons.	700 tons.	825 tons.	950 tons.	1,075 tons.		
" " 20 ft. Grade	240 "	290 "	340 "	400 "	460 "	520 "		
" " 40 ft. "	160 "	195 "	225 "	265 "	310 "	350 "		
" " 60 ft. "	120 "	145 "	170 "	200 "	230 "	260 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "	205 "		
" " 100 ft. "	80 "	95 "	110 "	130 "	150 "	170 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

* See page 193.

CLASS "E" LOCOMOTIVE—WITH TENDER.

FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS E	10—E	11—E	12—E	13—E	14—E	15—E		
Cylinders, Diameter	10"	11"	12"	13"	14"	15"		
" Stroke	16"	16"	16"	18"	18"	18" or 20"		
Diameter of Driving Wheels	36"	36"	36"	36" to 40"	36" to 40"	36" to 42"		
" Truck "	24"	24"	24"	24"	24" to 26"	24" to 26"		
Wheel Base, Rigid	10' 8"	11' 2"	11' 8"	11' 0"	11' 0"	11' 0"		
" " Total	16' 1"	16' 10"	17' 4"	16' 10"	16' 11"	17' 1"		
" " Engine and Tender	32' 9"	33' 11"	35' 11"	36' 6"	37' 7"	39' 0"		
Length of Engine and Tender	39' 9"	41' 5"	43' 8"	44' 6"	45' 9"	47' 2"		
Weight of Engine Loaded, Total	32,000 lbs.	36,000 lbs.	41,000 lbs.	46,000 lbs.	51,000 lbs.	56,000 lbs.		
" " " on Drivers	27,000 "	31,000 "	35,000 "	40,000 "	44,000 "	48,000 "		
" " " on Truck	5,000 "	5,000 "	6,000 "	6,000 "	7,000 "	8,000 "		
Capacity of Tank	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.	1,400 gal.	1,500 gal.		
Hauling Capacity on Level *	665 tons.	760 tons.	860 tons.	985 tons.	1,080 tons.	1,180 tons.		
" " 20 ft. Grade	315 "	360 "	410 "	470 "	515 "	560 "		
" " 40 ft. "	210 "	235 "	270 "	310 "	335 "	370 "		
" " 60 ft. "	150 "	160 "	195 "	225 "	245 "	270 "		
" " 80 ft. "	120 "	135 "	150 "	175 "	190 "	210 "		
" " 100 ft. "	95 "	110 "	125 "	145 "	155 "	170 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

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* See page 193.

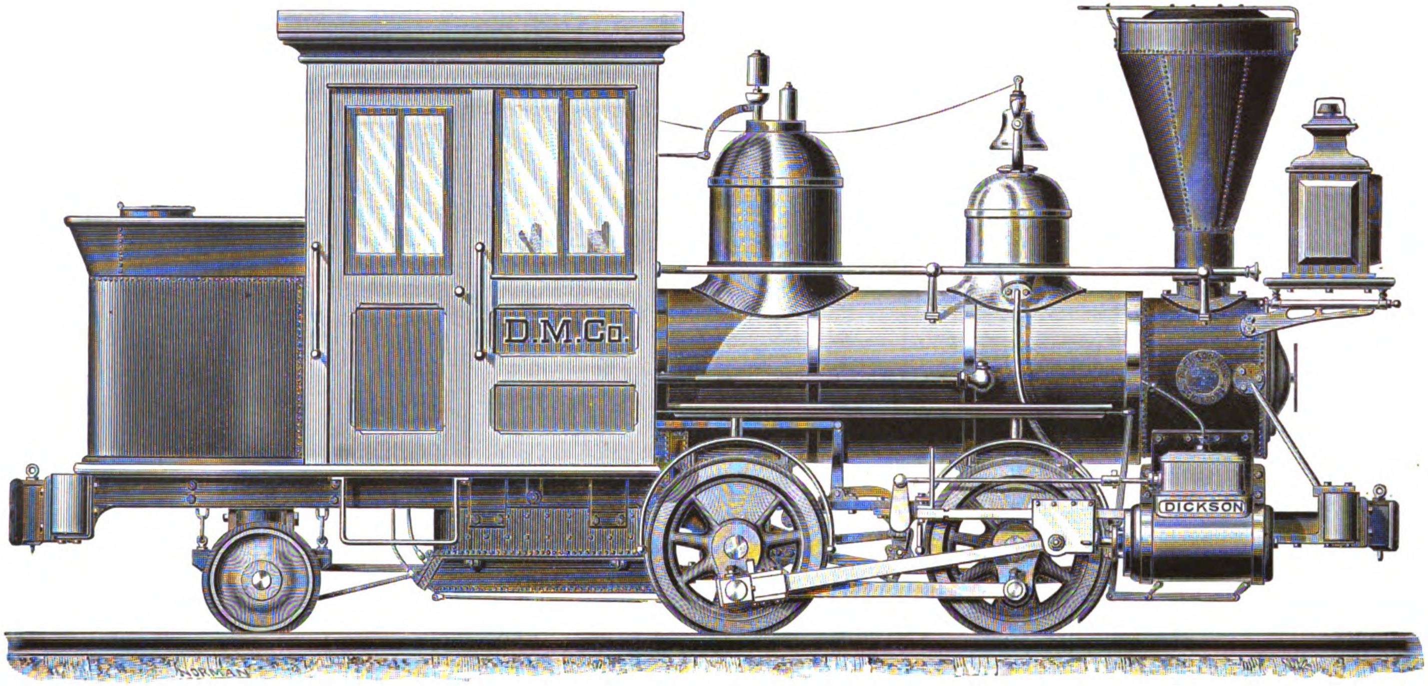
CLASS "E" LOCOMOTIVE.

On the preceding pages we present the general dimensions, weights and hauling capacities of several sizes of the six wheels coupled "Tank Switching" Locomotive, with pony truck. This is designed for switching service, or for very short runs in the suburban service of cities or for logging service, as it runs steadily and passes with ease around curves of short radius.

It is built with the tank on the boiler, or with a separate tender forming a "Mogul" locomotive.

TANK LOCOMOTIVE.

CLASS I.



FUEL, COAL OR WOOD.

CLASS "I" TANK LOCOMOTIVE.

GAUGE, 30 INCHES AND WIDER.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	7—I	8—I	9—I	10—I	11—I			
Cylinders, Diameter	7″	8″	9″	10′	11″			
" Stroke	10″	12″	14″	16″	16′			
Diameter of Driving Wheels	26½″	29″	29″	32″	32″			
" Truck Wheels	18″	20″	20″	20″	20″			
Wheel Base, Rigid	3′ 6″	3′ 9″	4′ 0″	4′ 3″	4′ 6″			
" " Total	10′ 0″	10′ 6″	11′ 0″	11′ 6″	12′ 0″			
Length of Engine without Pilot	18′ 0″	19′ 0″	20′ 0″	21′ 0″	22′ 0″			
" " with one Pilot	20′ 0″	21′ 0″	22′ 0″	23′ 3″	24′ 6″			
Weight, Loaded, Total	15,000 lbs.	20,000 lbs.	25,000 lbs.	30,000 lbs.	35,000 lbs.			
" " on Drivers	11,000 "	15,000 "	19,000 "	23,000 "	27,000 "			
" " on Truck	4,000 "	5,000 "	6,000 "	7,000 "	8,000 "			
Capacity of Tank	200 gal.	250 gal.	300 gal.	400 gal.	450 gal.			
Hauling Capacity on Level*	250 tons.	325 tons.	425 tons.	525 tons.	625 tons.			
" " 20 ft. Grade	120 "	155 "	205 "	250 "	300 "			
" " 40 ft. "	80 "	105 "	135 "	170 "	200 "			
" " 60 ft. "	60 "	75 "	100 "	125 "	150 "			
" " 80 ft. "	45 "	60 "	80 "	100 "	115 "			
" " 100 ft. "	40 "	50 "	65 "	80 "	95 "			
Prices ready for service at works in Scranton	$	$	$	$	$			

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* See page 193.

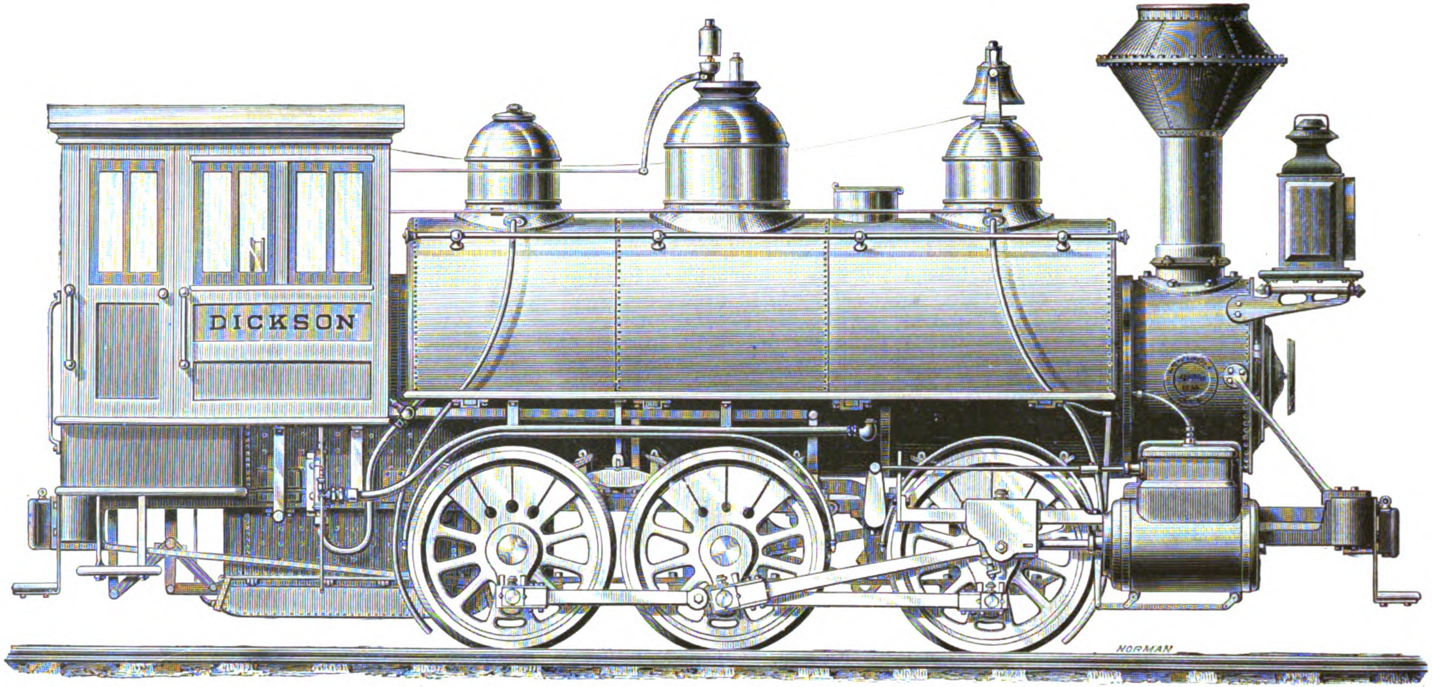
CLASS "I" TANK LOCOMOTIVE.

On the preceding page we present the principal dimensions and hauling capacities of several sizes of this locomotive, which is made either with the tank as shown in the engraving or on the boiler.

The locomotive is designed for logging or plantation service. The rear truck, which is used whether the tank is on the boiler or not, is of the swing-bolster, radius-bar kind, and permits the engine to pass around curves safely and to run steadily.

SIX WHEELS COUPLED TANK LOCOMOTIVE.

CLASS D.



FUEL, COAL OR WOOD.

CLASS "D" TANK LOCOMOTIVE.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS	9—D	10—D	11—D	12—D	13—D	14—D		
Cylinders, Diameter	9"	10"	11"	12"	13"	14"		
" Stroke	14"	16"	16"	18"	18"	18"		
Diameter of Driving Wheels	28" to 30"	30" to 33"	33" to 36"	36" to 40"	36" to 40"	36" to 40"		
Wheel Base	6' 4"	6' 8"	7' 0"	7' 6"	8' 0"	8' 6"		
Length of Engine	17' 9"	18' 8"	19' 7"	20' 7"	21' 7"	22' 3"		
Weight, ready for service	26,000 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.	46,500 lbs.	52,000 lbs.		
Capacity of Tank	350 gal.	400 gal.	450 gal.	500 gal.	550 gal.	600 gal.		
Hauling Capacity on Level *	600 tons.	725 tons.	825 tons.	950 tons.	1,075 tons.	1,200 tons.		
" " 20 ft. Grade	290 "	350 "	400 "	460 "	520 "	580 "		
" " 40 ft. "	195 "	235 "	265 "	310 "	350 "	390 "		
" " 60 ft. "	145 "	175 "	200 "	230 "	260 "	290 "		
" " 80 ft. "	115 "	140 "	155 "	180 "	205 "	230 "		
" " 100 ft. "	95 "	115 "	130 "	150 "	170 "	190 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

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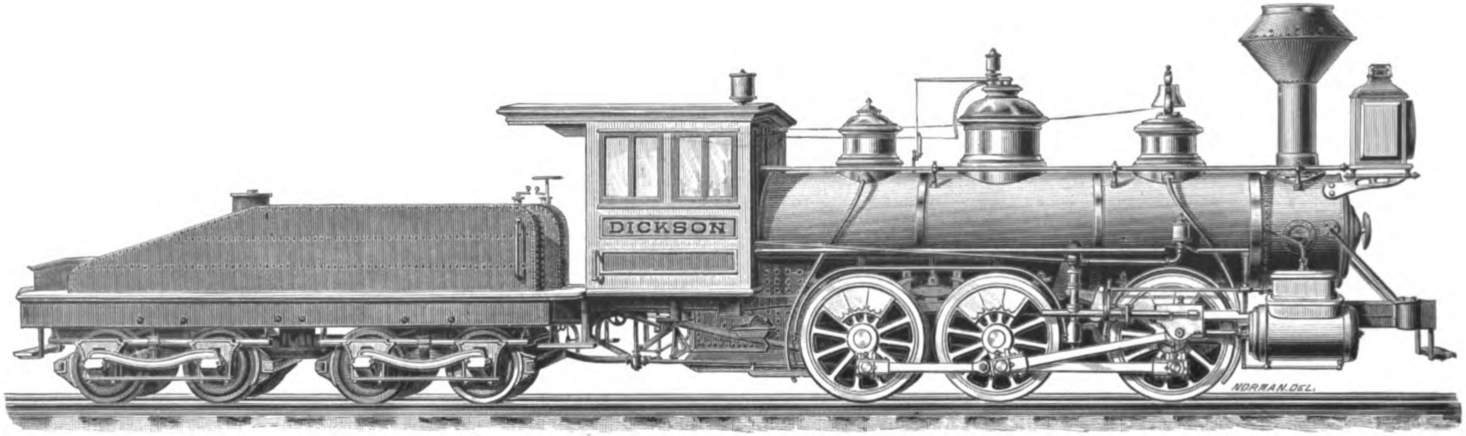
* See page 193.

CLASS "D" LOCOMOTIVE.

This style of engine is designed for switching service in yards, depots or stations, logging or plantation service, and can also be used for short runs on local roads. They are built with the tank placed either on the top or sides of the boiler, thereby utilizing all the weight for adhesion. The weight is equally distributed on all six driving wheels. There is an equalizing lever between middle and back wheels on each side, and the forward wheels are also equalized across in front, thus giving the engine an easy and steady motion.

SIX WHEELS COUPLED LOCOMOTIVE—WITH TENDER.

CLASS D.



FUEL, COAL OR WOOD.

CLASS "D" LOCOMOTIVE—WITH TENDER.

NARROW GAUGE. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF SIX SIZES OF THIS CLASS.

CLASS.	9—D	10—D	11—D	12—D	13—D	14—D		
Cylinders, Diameter	9″	10″	11″	12″	13″	14″		
" Stroke	14″	16″	16″	18″	18″	18″		
Diameter of Driving Wheels	28″ to 30″	30″ to 33″	33″ to 36″	36″ to 40″	36″ to 40″	36″ to 40″		
Wheel Base of Engine	6′ 4″	6′ 8″	7′ 0″	7′ 6″	8′ 0″	8′ 6″		
" " " and Tender	20′ 11″	21′ 6″	26′ 0″	27′ 1″	29′ 3″	30′ 5″		
Length of Engine and Tender	29′ 1″	30′ 0″	33′ 10″	35′ 6″	38′ 0″	39′ 2″		
Weight of Engine, ready for service	22,000 lbs.	26,000 lbs.	31,000 lbs.	36,000 lbs.	41,000 lbs.	46,000 lbs.		
Capacity of Tank	900 gal.	900 gal.	1,000 gal.	1,100 gal.	1,200 gal.	1,300 gal.		
Hauling Capacity on Level	540 tons.	640 tons.	760 tons.	885 tons.	1,010 tons.	1,135 tons.		
" " 20 ft. Grade	255 "	305 "	360 "	420 "	480 "	540 "		
" " 40 ft. "	170 "	200 "	235 "	275 "	315 "	360 "		
" " 60 ft. "	120 "	145 "	170 "	200 "	230 "	260 "		
" " 80 ft. "	95 "	115 "	135 "	155 "	180 "	205 "		
" " 100 ft. "	75 "	95 "	115 "	130 "	145 "	165 "		
Prices ready for service at works in Scranton	$	$	$	$	$	$		

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* See page 193.

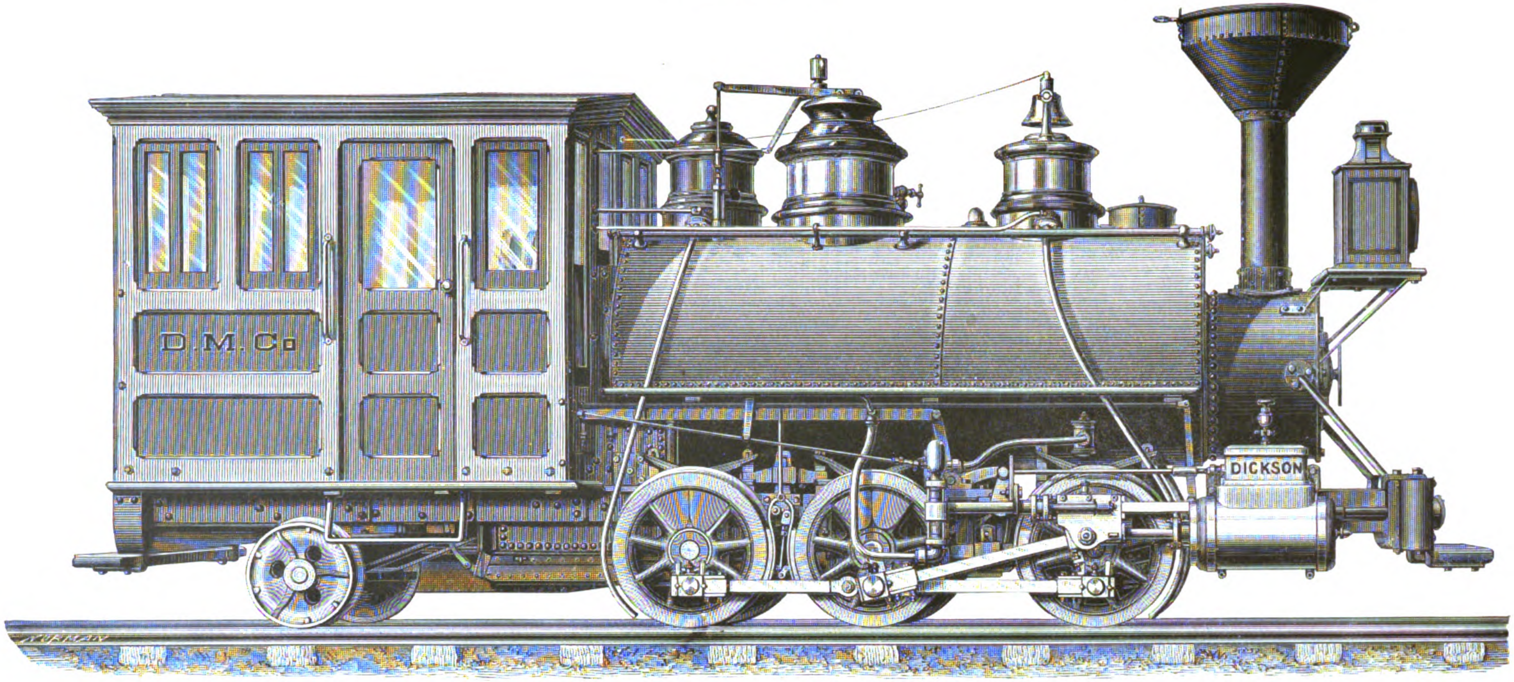
CLASS "D" LOCOMOTIVE.

WITH TENDER.

This style of engine is designed for switching service in yards, depots or stations, logging and plantation service, and can also be used for short runs on local roads. They are built with separate tenders, having either six wheels or two four-wheel trucks. All the weight of the engine is equally distributed, and carried, on the six driving wheels, thereby utilizing all the weight for adhesion. There is an equalizing lever between the middle and back driving wheels on each side, and the front driving wheels are also equalized across in front, thus giving the engine an easy and steady motion.

SIX WHEELS COUPLED TANK LOCOMOTIVE—WITH TRAILING TRUCK.

CLASS M.



30-INCH GAUGE AND WIDER.

FUEL, COAL OR WOOD.

CLASS "M" TANK LOCOMOTIVE—WITH TRAILING TRUCK.

GAUGE, 30 INCHES AND WIDER. FUEL, COAL OR WOOD.

DIMENSIONS AND CAPACITIES OF FIVE SIZES OF THIS CLASS.

CLASS	7—M	8—M	9—M	10—M	11—M
Cylinders, Diameter	7"	8"	9"	10"	11"
" Stroke	10"	12"	14"	16"	16"
Diameter of Driving Wheels	26½"	29"	29"	32"	32"
" Truck Wheels	18"	20"	20"	20"	20"
Wheel Base, Rigid	6' 0"	6' 3"	6' 6"	6' 9"	7' 0"
" " Total	12' 6"	13' 0"	13' 6"	14' 0"	14' 6"
Length of Engine without Pilot	20' 8"	21' 6"	22' 6"	23' 6"	24' 3"
" " with One Pilot	22' 8"	23' 6"	24' 6"	25' 9"	26' 9"
Weight, Loaded, Total	18,000 lbs.	23,000 lbs.	28,000 lbs.	33,000 lbs.	38,000 lbs.
" " on Drivers	14,000 "	18,000 "	22,000 "	26,000 "	30,000 "
" " on Truck	4,000 "	5,000 "	6,000 "	7,000 "	8,000 "
Capacity of Tank	200 gal.	250 gal.	300 gal.	400 gal.	450 gal.
Hauling Capacity on Level *	325 tons.	400 tons.	500 tons.	600 tons.	700 tons.
" " 20 ft. Grade	155 "	190 "	240 "	290 "	335 "
" " 40 ft. "	105 "	130 "	160 "	190 "	225 "
" " 60 ft. "	75 "	95 "	120 "	140 "	165 "
" " 80 ft. "	60 "	75 "	95 "	110 "	130 "
" " 100 ft. "	50 "	60 "	75 "	95 "	110 "
Prices ready for service at works in Scranton	$	$	$	$	$

* See page 193.

CLASS "M" TANK LOCOMOTIVE.

We offer the class "M" locomotive as a good and powerful type of engine for logging or plantation service. The tank may be placed over the boiler as shown in the engraving, or as we have sometimes built them, with the tank over the truck.

The engine will curve readily, as the truck is provided with a swing bolster and radius bar, and will be free from plunge. The driving wheels are all equalized together, rendering the engine easy riding on a rough track.

COMPRESSED AIR LOCOMOTIVES.

We are prepared to build locomotives for working by compressed air, and recommend them for use in confined places where the gases from ordinary locomotives foul the atmosphere. Such locomotives become indirectly good ventilating machines and increase the comfort of working.

LOCOMOTIVE BOILERS.

We are prepared to submit proposals for locomotive boilers of any desired type and size, to railroads or any who may require them for repairs or new constructions. The best material and workmanship are employed in their manufacture; they have our hydraulic flanged heads, and are riveted by our hydraulic riveter.

We build these boilers from our own plans, or from plans furnished by the purchaser, and feel confident that we can furnish not only a better boiler, but at less cost than those who have not an equally complete plant for their manufacture, and the requirements of few roads only are sufficient to warrant the large expenditure necessary to furnish such a plant.

HYDRAULIC FLANGING.

By the treatment which a plate receives when flanged by hand, the edge is alternately elongated and compressed, and subjected to damaging extremes of temperature; neither is it free from liability to burn. Moreover, at the completion of the operation it is far from being flat and uniformly curved, and requires considerable working to fit it in its place.

The advantages of hydraulic flanging, apart from its rapidity *per se*, are that the plate is heated in a special furnace to a moderate, uniform temperature throughout, the flanging is all done at one operation in two or three minutes' time, so that the metal flows into its new form with but little strain, and the plate is left flat and exact in shape.

ROUND HEADS.

THE DICKSON MANUFACTURING COMPANY keep in stock, and can supply immediately upon the receipt of orders, round boiler heads of the sizes given in the table below, and at prices which are but a small advance upon the cost of the plain sheet. These heads are made of plates furnished by the Nashua Iron and Steel Co., Nashua, N. H., and are guaranteed to have a tensile strength of 60,000 lbs. per square inch, and an elastic limit of 33,000 lbs. per square inch.

We can offer round heads:—

From 20 inches to 26 inches in diameter, inclusive, at .... per lb.
From 28 inches to 48 inches, inclusive .... at .... per lb.
From 50 inches to 72 inches, inclusive .... at .... per lb.

Prices subject to change without notice.

DIMENSIONS OF ROUND HEADS,

WITH A FLANGE 2½ INCHES HIGH.

Outside diameter, inches.....	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72
Thickness of plate...........	3/8	3/8	3/8	13/32	13/32	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	1/2	1/2	1/2	1/2	1/2	17/32	17/32	9/16	9/16	9/16	9/16

For sizes larger than 72 inches in diameter, we will make special prices.

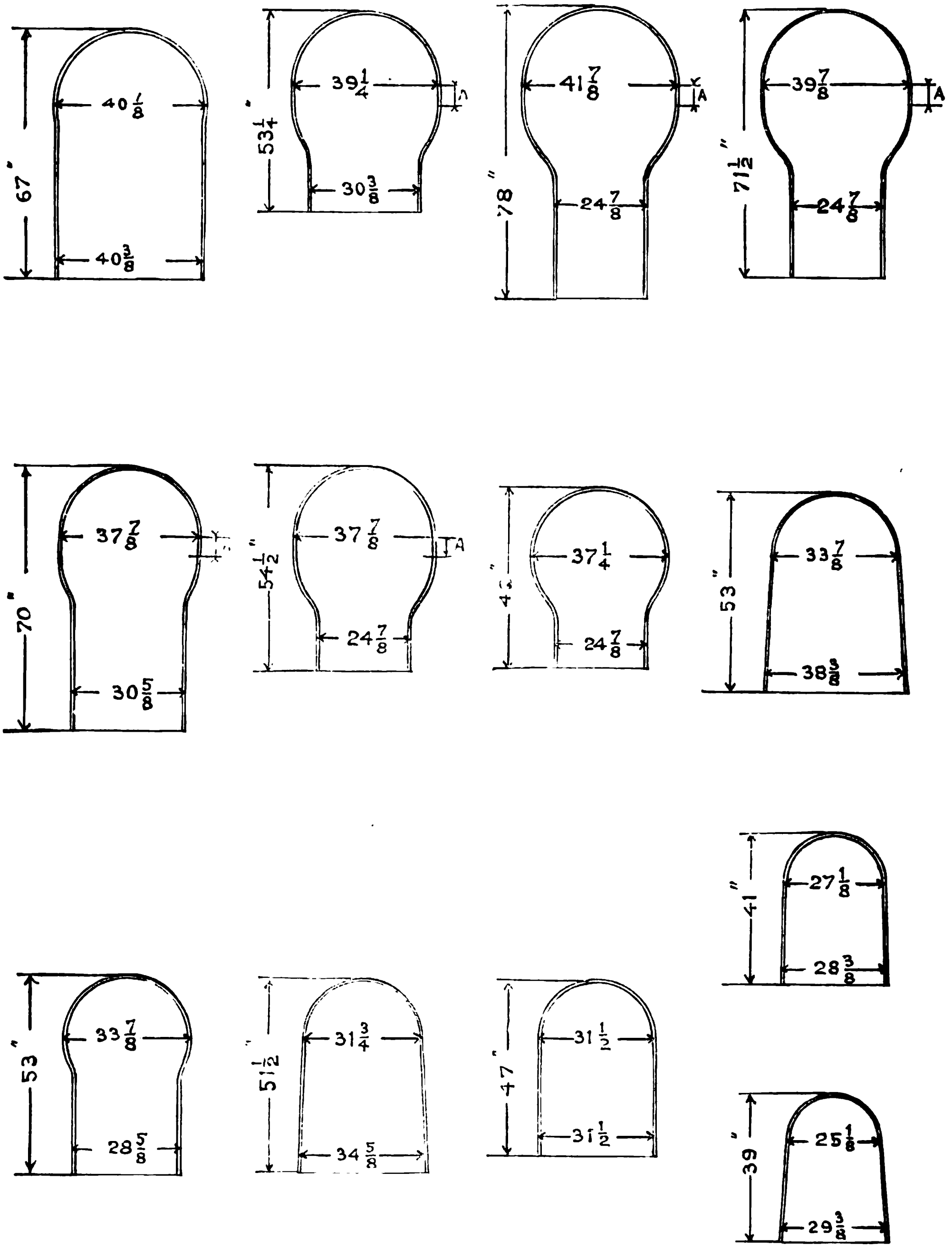
BACK HEAD AND TUBE SHEETS

FOR LOCOMOTIVE BOILERS.

We have a large stock of formers for locomotive boiler work, and can offer back heads and flue sheets of such sizes as we have, much cheaper than they can be flanged by hand, and much better. For special shapes and sizes, if ordered in quantities, we will make special prices.

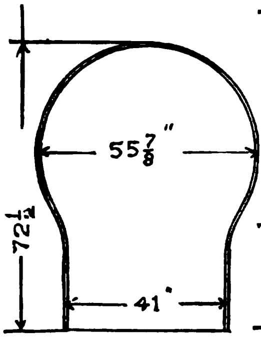
On the following pages we give engravings of some of the back heads and tube sheets for which we have formers.

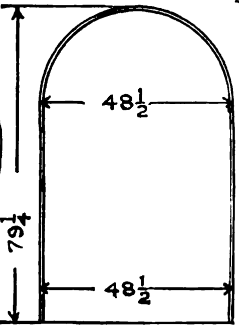
BACK HEAD SHEETS FOR LOCOMOTIVES

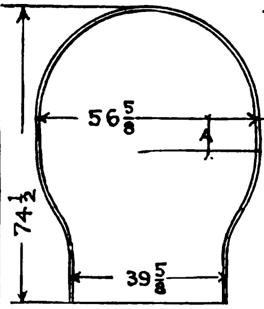


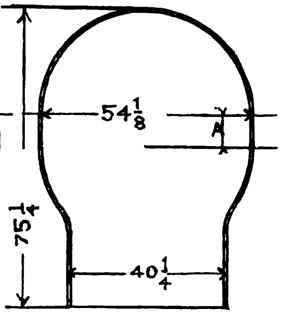
The dimension marked "A", and also the total height of heads, can be varied to any extent desired.

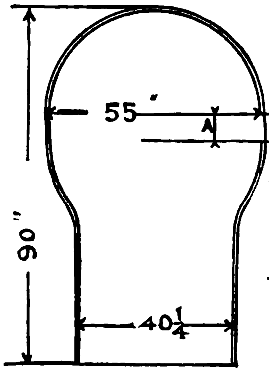
BACK HEAD SHEETS FOR LOCOMOTIVES

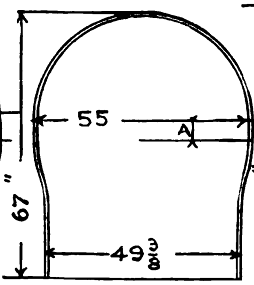


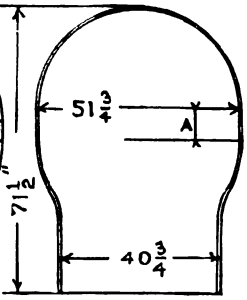


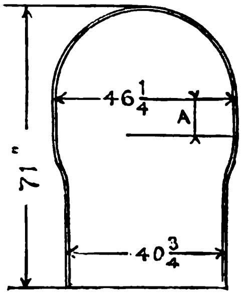


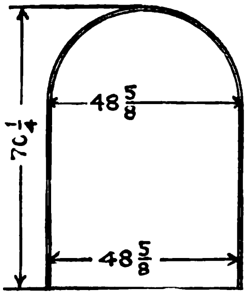


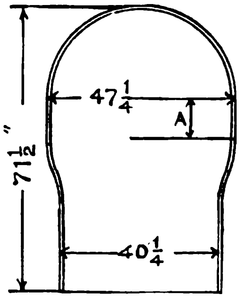


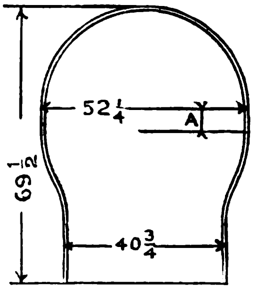


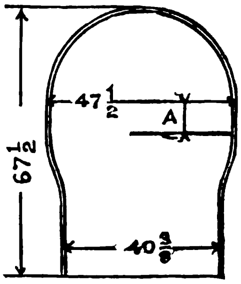






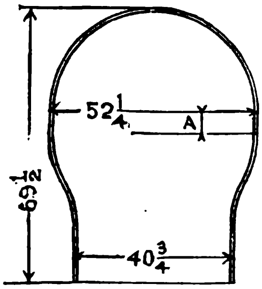


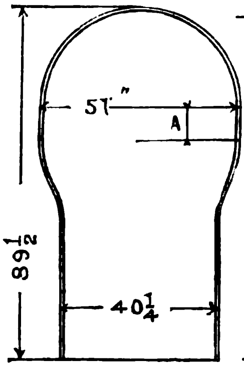


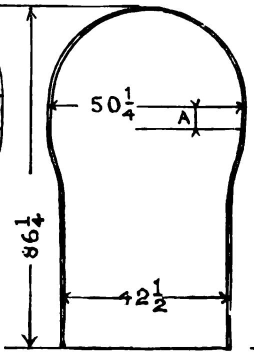


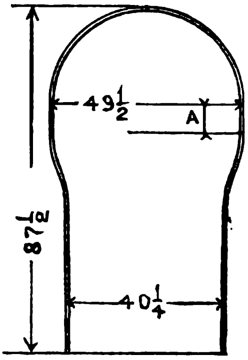
The dimension marked "A", and also the total height of heads, can be varied to any extent desired.

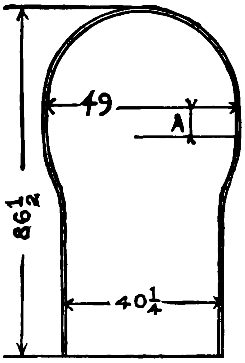
BACK HEAD SHEETS FOR LOCOMOTIVES

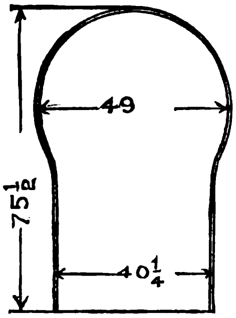


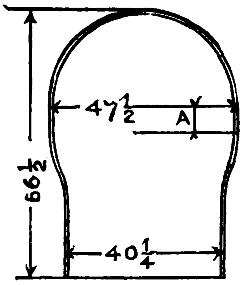


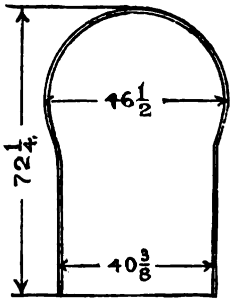


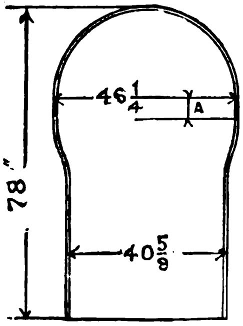


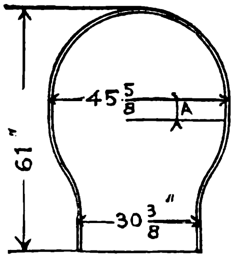


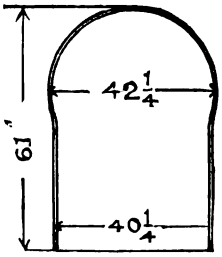


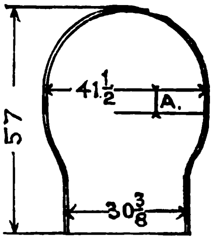






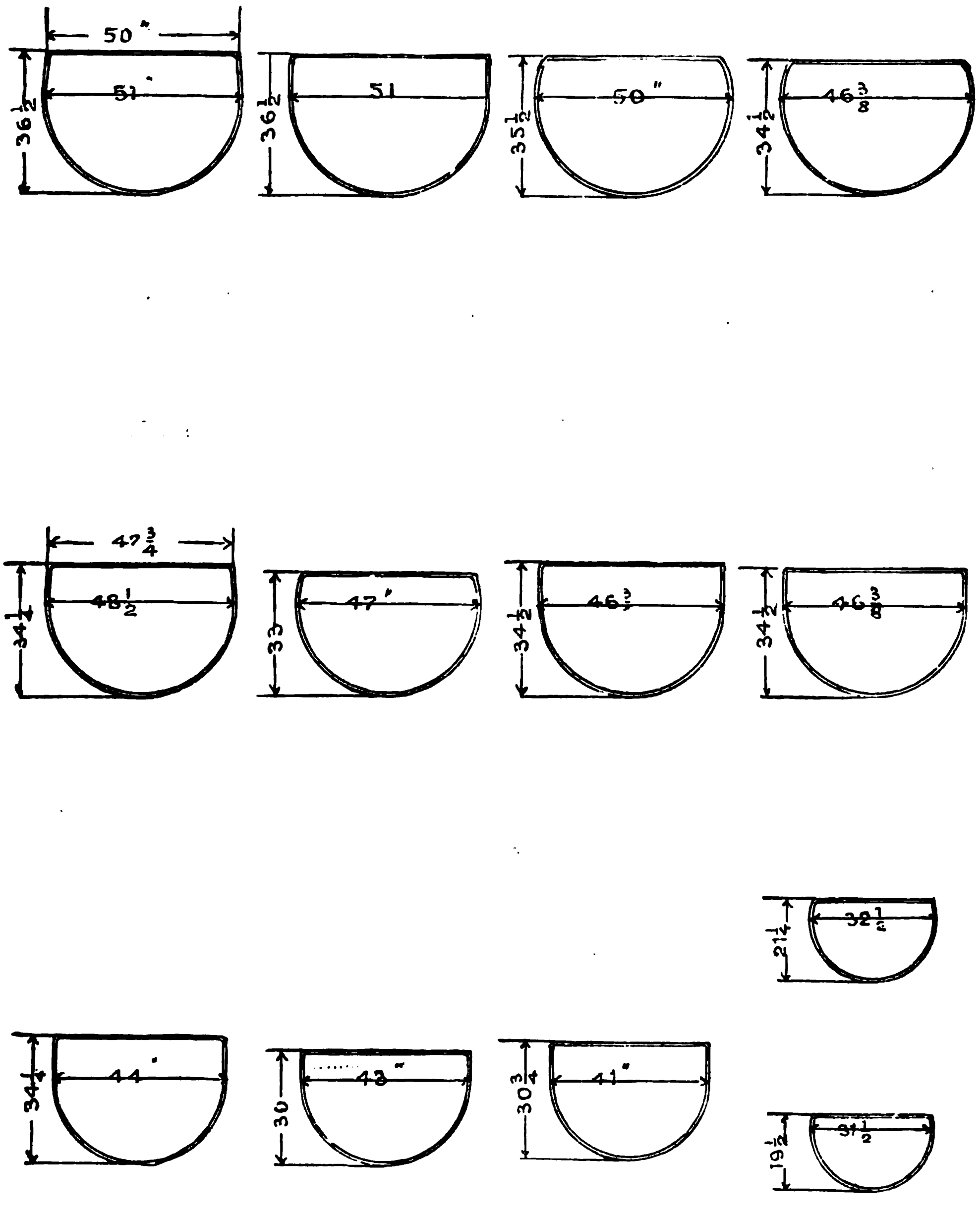




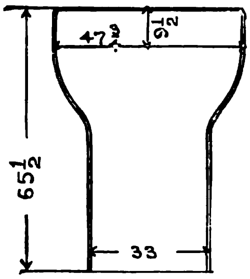


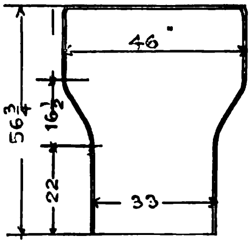
The dimension marked "A", and also the total height of heads, can be varied to any extent desired

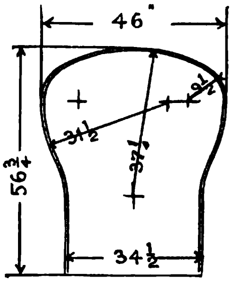
BACK FLUE HEAD SHEETS FOR LOCOMOTIVES

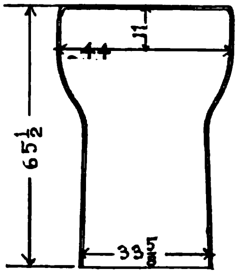


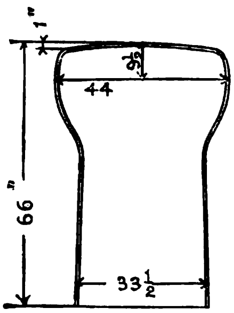
FIRE BOX END SHEETS FOR LOCOMOTIVES

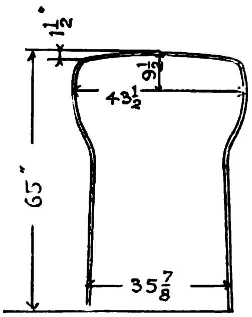


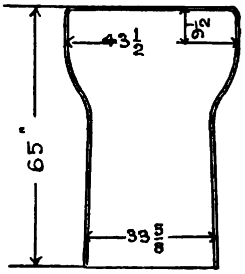


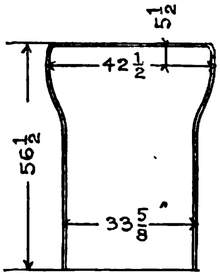


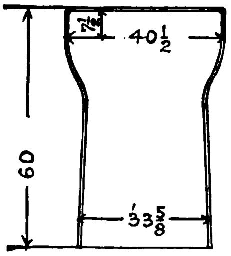


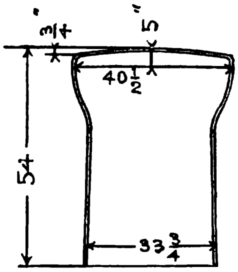


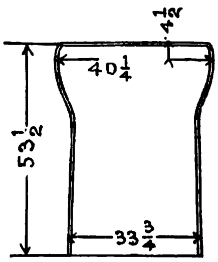


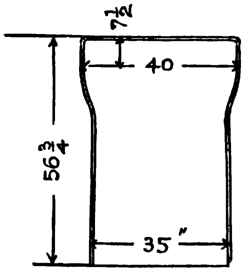












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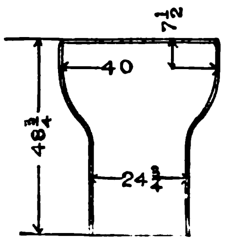
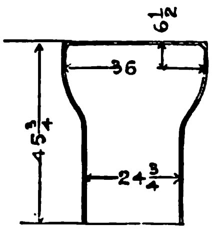
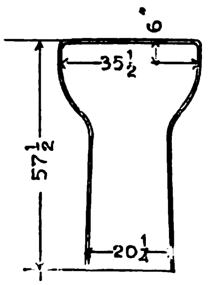
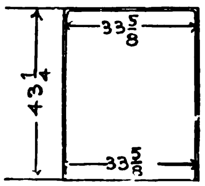
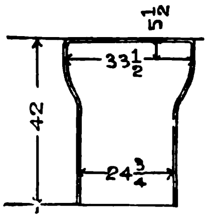
Fire Box end sheets for Locomotives

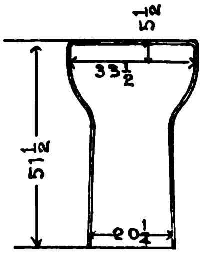


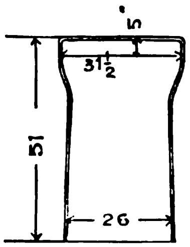


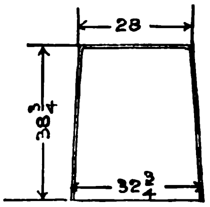


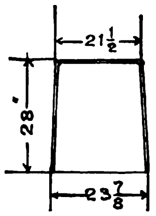


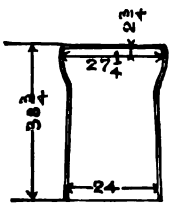


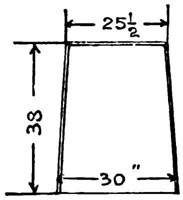


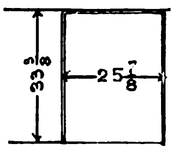


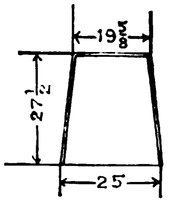












The width and length of these sheets can be varied to any extent desired

LOCOMOTIVE TANKS.

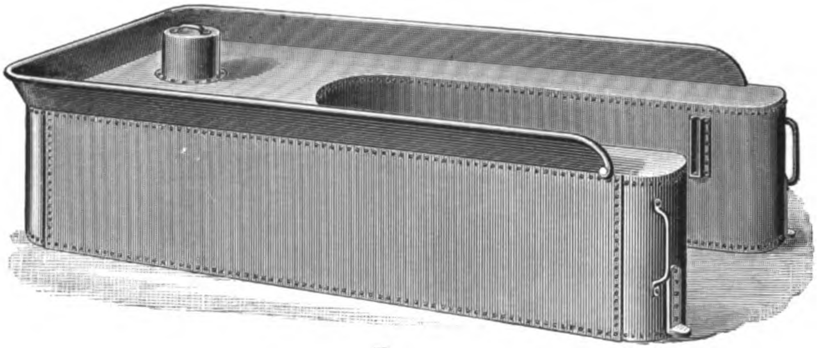


FIG. 1.

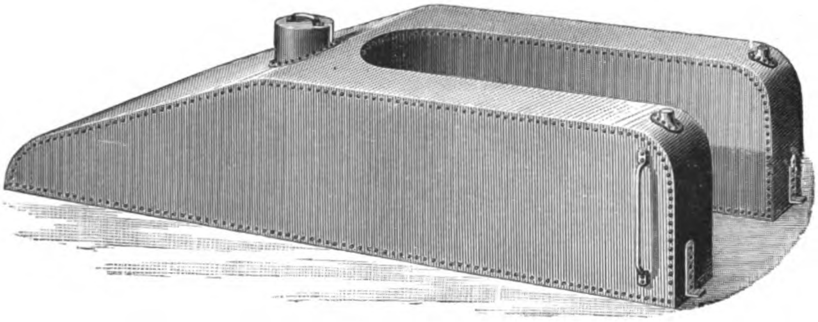


FIG. 2.

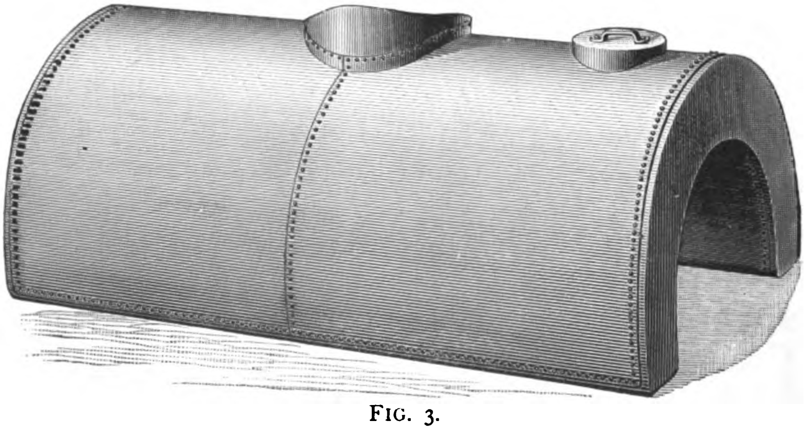


FIG. 3.

THE DICKSON MFG. CO. is prepared to take contracts to build locomotive tanks for railroad companies and others. Some of the usual designs are shown in the cuts above. FIG. 1 shows a tank for separate tenders. FIG. 2 a special form for separate tenders of switching engines, the slope of the top permitting the engine men to see close to the rear of the tender. FIG. 3 shows the best form of saddle tank to use on top of the boiler.

These tanks are made of the best tank iron or steel, and the workmanship is first class throughout.

Prices upon application.

Locomotive Castings and Forgings.

THE DICKSON MANUFACTURING CO. are prepared to make for railroad companies and others, all castings and forgings used in locomotive construction and about railroads generally. A number of these are illustrated on the following pages, and will be made of any desired material and furnished either rough, rough finished or finished to dimensions.

Wheels will be furnished on axles if desired.

CYLINDER.

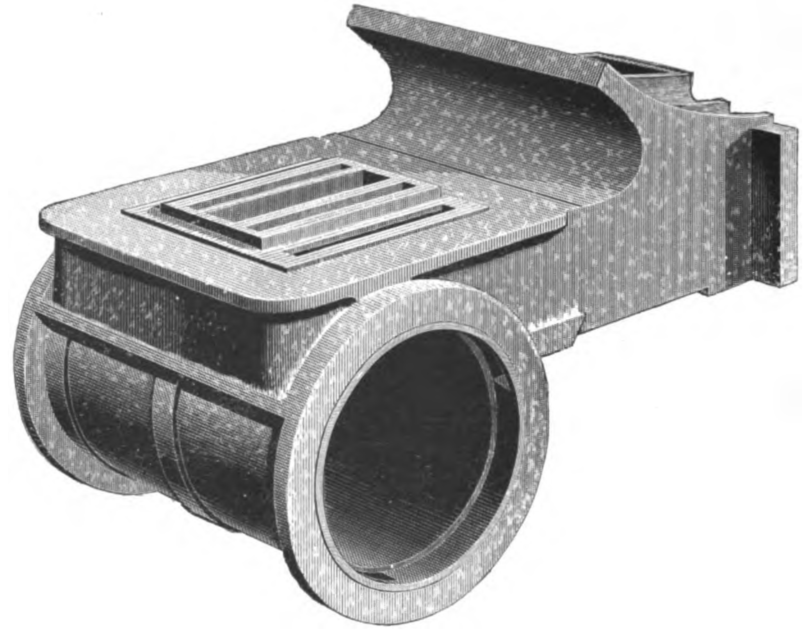


FIG. 4.

These cylinders are made of the best close-grained iron as hard as can be worked. The castings are sound and smooth. They are made reversible and interchangeable.

PRICES OF CYLINDERS.

Diameter in Inches.	**Stroke in Inches.**	**Rough, Per lb.**	**Bored.**	**Bored and Planed.**	**Finished Complete.**

DRIVING WHEEL.

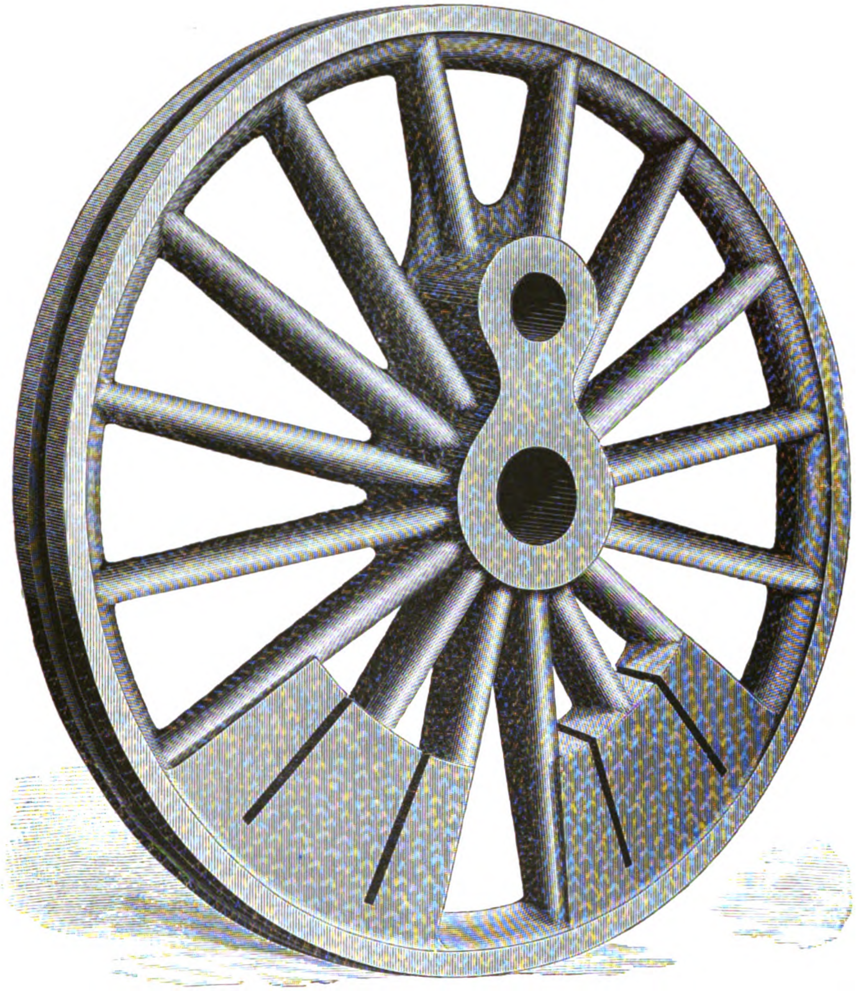


FIG. 5.

Driving wheels are made of good, strong close-grained iron. The counterweights are cast in, unless otherwise ordered; the rim and arms are solid or cast hollow, as preferred. The rim and counterweights are divided in several places to diminish the inherent strains due to cooling.

PRICES OF DRIVING WHEELS.

Diameter of Casting.	Rough, Per lb.	Finished, Per lb.

Special prices will be given for fitting wheels with axles and tires.

ENGINE TRUCK WHEEL.

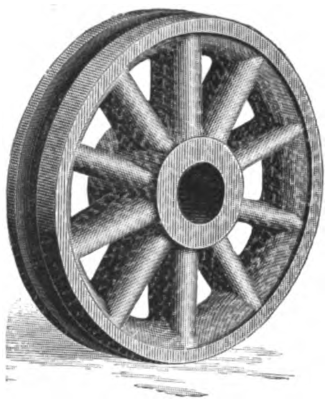


FIG. 6.

FIG. 6 represents a truck wheel made to receive a steel tire. They are made of the best quality of iron.

PRICES OF TRUCK WHEELS, TO RECEIVE STEEL TIRES

Diameter of Centre.	Centre Rough, Per lb.	Centre Finished, Per lb.	Finished Wheel with Tire 2⅛" thick, Each.	Pair of Finished Wheels with Tires, fitted on Axles.
20"				
23½"				
25'				
26"				

CHILLED PLATE AND SPOKE WHEELS.

At the Wilkes-Barre Works THE DICKSON MANUFACTURING CO. make a specialty of chilled-face, double-plate wheels for locomotive trucks, tenders, and for cars. The wheels are warranted to be sound, smooth on the tread, evenly chilled, truly circular, and will be paired so as to have the wheels on one axle of the same diameter.

PRICES OF CHILLED WHEELS.

Diameter on Tread in Inches.	Weight, Pounds.	Price of Double Plate Wheel, Rough.	Price of Double Plate Wheel, Bored and Faced.	Price of Spoke Wheel, Rough.	Price of Spoke Wheel, Bored and Faced.	Price of a Pair Wheels fitted on a Finished Axle.	
						Plate.	Spoke.
12	51			$0.97	$1.03		
12	67			1.36	1.42		
14	85			1.72	1.78		
16	93			1.89	1.95		
18	117			2.38	2.44		
20	162			3.28	3.36		
22	185			3.75	3.85		
24	204			4.12	4.25		
24	210	$4.37	$4.50				
26	315	6.40	6.55				
28	425	8.75	8.90				
30	490	10.50	10.30				
33	545	12.00	12.30				

CROSS HEADS.

These cross heads are made of wrought iron, cast steel, or charcoal iron.

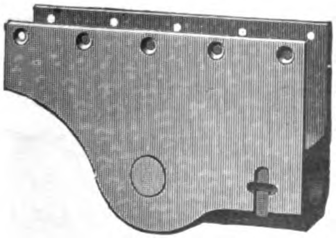


FIG. 7.

PRICES OF CROSS HEADS, PER POUND.

	Rough.	Finished.
Wrought Iron,		
Cast Steel,		
Charcoal Iron,		

THE SPRING-PLATE, STEEL-TIRED CAR WHEEL.

(H. M. BOIES PATENT, DECEMBER 18, 1883.)

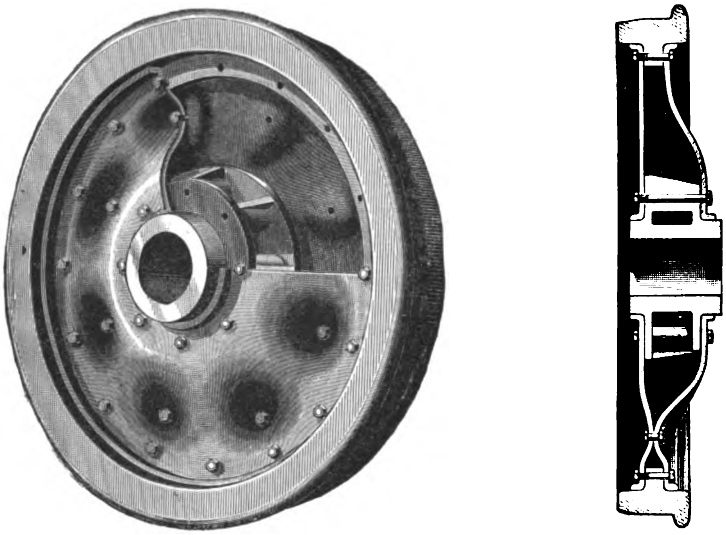


FIG. 8.

The construction of this wheel is such that the rolled steel tire is joined to the cast hub by two curved steel plates of such shapes as to oppose an elastic resistance in every direction from which strains and blows affect it. The great tensile strength and elasticity of the metal in these plates permits complete security from their breaking to coincide with the least dead weight in parts not exposed to wear, and the vibrations excited by the constant pounding of the tread of the wheel on the rail are lost in the spring of the curves before they reach the axle, so that this active cause of crystallization of axles is largely removed.

The expansion and contraction of the tire from heat induced by the application of the brakes and subsequent cooling, is permitted to occur by the curved shape of the plates without impairing the strength or durability of the wheel.

The shape of the plates between the bolts forms a *hollow spoke* between hub and tire, giving a maximum of strength for the amount of metal used.

The tire is firmly bolted to the plates through a heavy internal flange, which renders it impossible for it to get off the wheel by accident, and not only avoids the weakening of the tire by grooves, slots or holes, but actually reinforces it to such an extent that it can be worn or turned down to its extreme limit of service, and in case it should break the parts would still be held firmly in place by the bolts.

The outer flanges of the plates constitute a supporting arch inside the tire as elastic as the tire itself, and also contributes to the durability of the tire.

The inner or central flanges of the plates are shrunken on each end of the hub supporting the weight, and are also steel bands strengthening and binding the hub to the axle, so that the wheel would run if the hub should be burst or broken.

The thrust of the axle is expended upon an arched spring of a strong curve in the opposite plate.

This wheel is composed of *only four principal parts*, the tire, two plates and the hub, which is less than are found in any other steel-tired wheel that we know of.

The tires are rolled from the best open-hearth or crucible steel, and are matched in pairs of the same metal, so as to wear equally, and when worn out can be quickly and easily replaced in any properly equipped shop. The plates are of the best open-hearth steel, formed hot by hydraulic pressure and annealed. The bolts are of the best iron, accurately fitted into reamed holes, and the hubs of strong cast iron.

The parts are put together in the very best manner to insure durability.

This wheel is not weakened by heat engendered by the application of the brakes.

Its elasticity prevents deterioration from the constant pounding on the rail.

It will not absorb moisture and burst or break from frost.

Experience proves that the bolts do not "shear" or loosen.

It is not subject to the breakages to which cast iron is liable.

It reduces the danger of accidents caused by the breaking of axles.

It is considerably lighter than other steel-tired wheels, and thus diminishes the constant traction load.

We believe it is the best, as well as the cheapest, steel-tired wheel in the market.

It has been successfully tested since June, 1884, by constant use in the passenger-car service on the Delaware & Hudson Canal Company Railroad, and is now in use on the following roads: New York, Lake Erie & Western R. R., Lehigh Valley R. R., Ulster & Delaware R. R., Ohio & Mississippi R. R., Columbus, Hocking Valley & Toledo R. R., Cincinnati, Hamilton & Dayton R. R., Union Pacific R. R., Fall Brook Coal Co., Mann's Boudoir Car Co., Boston & Providence R. R., New York, Providence & Boston R. R., Baltimore & Ohio R. R., Delaware, Lackawanna & Western R. R., Richmond & Alleghany R. R., Denver & Rio Grande R. R., Chicago, Milwaukee & St. Paul Ry., Chicago, St. Paul, Minn. & Omaha R. R., Fitchburg R. R., and Chicago & North Western Ry.

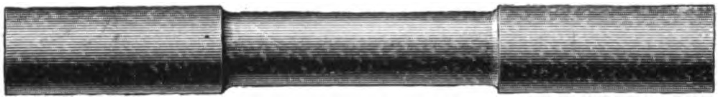
We are prepared to supply these wheels promptly, either 33 inches or 42 inches in diameter, in pairs, on the master car-builders' axle, of the best hammered iron from No. 1 wrought scrap, without charge for mounting, or bored to gauge as may be desired, and guarantee the wheels against breakage in ordinary use as long as the tires last.

PRICES.

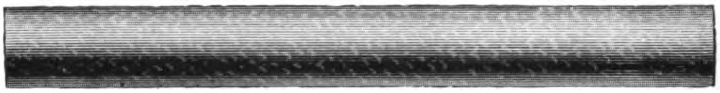
26-inch	wheel,	2¼-inch	tire,	master	car-builders'	tread and	flange,	. .	$..................	each.
28-inch	"	2¼-inch	"	"	"	"	"	. . .	....	"
30-inch	"	2¼-inch	"	"	"	"	"	. .	....	"
33-inch	"	2¼-inch	"	"	"	"	"	. . .	....	"
36-inch	"	2¼-inch	"	"	"	"	"	. .	....	"
42-inch	"	2¼-inch	"	"	"	"	"	. . .	....	"

Axles, master car-builders' standard, ... cents per pound.

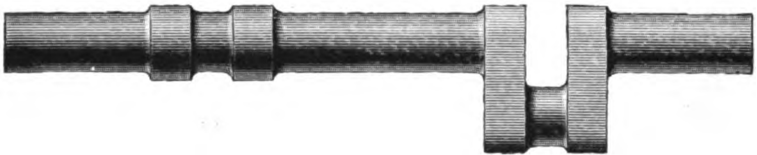
AXLES.



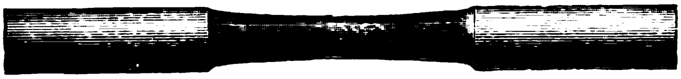
DRIVING AXLE.



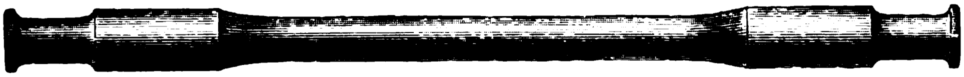
DRIVING AXLE.



DRIVING AXLE.



ENGINE TRUCK AXLE.



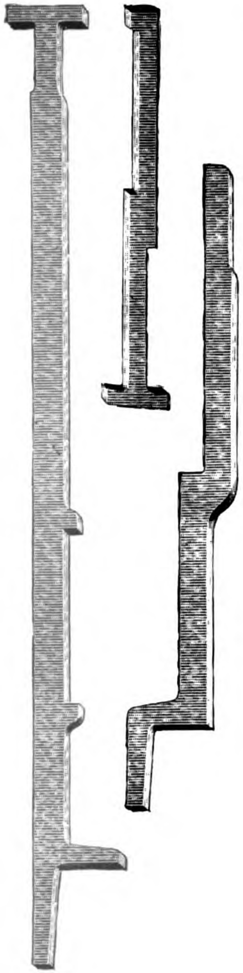
TENDER OR CAR TRUCK AXLE.

FIG. 9.

These axles are made of the best hammered iron, or of forged open-hearth steel, and will be furnished rough, rough finished or finished to dimensions.

PRICES OF AXLES, PER POUND.

Kind of Axle.	Iron, Forging.	Iron, Rough Turned.	Iron, Finished.	Steel, Forging.	Steel, Rough Turned.	Steel, Finished.
Driving, with reduced middle,						
Driving, uniform diameter,						
Driving Crank,						
Engine Truck,						
Engine Tender,						
Car,						



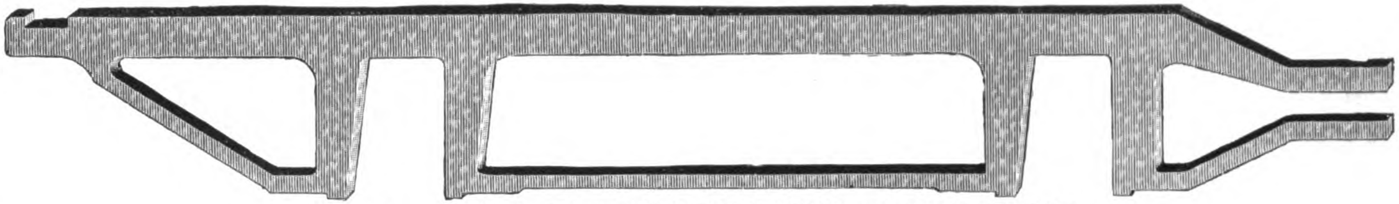


FIG. 10. FRAME OF "AMERICAN" TYPE OF LOCOMOTIVE.

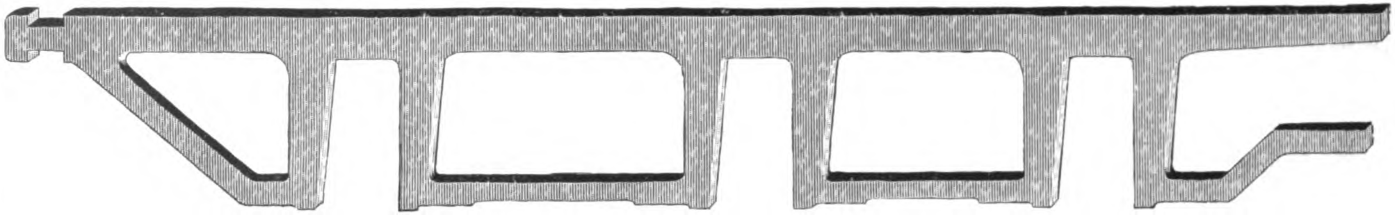


FIG. 11. FRAME OF "MOGUL" OR "TEN-WHEEL" TYPE OF LOCOMOTIVE.

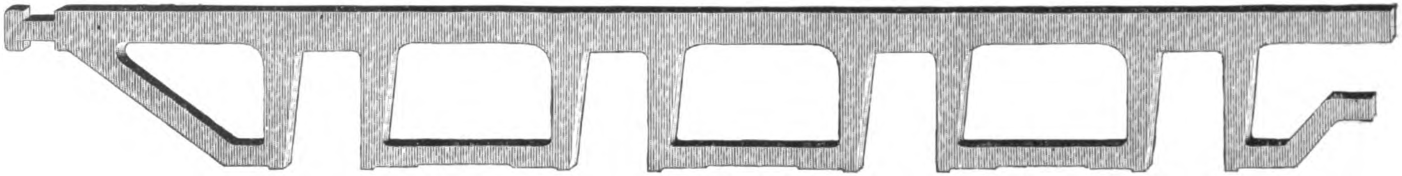


FIG. 12. FRAME OF "CONSOLIDATION" TYPE OF LOCOMOTIVE.

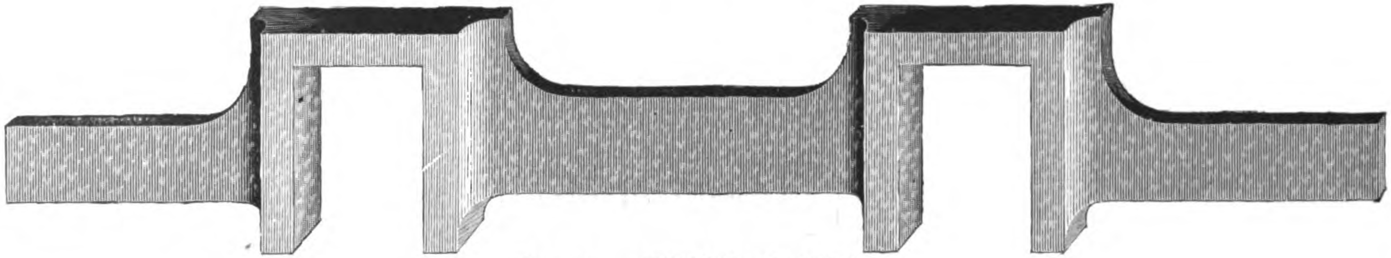


FIG. 13. SPECIAL FRAME.

These frames are made of the best hammered iron, and are either forged solid as shown in the engravings, or built up, and will be furnished in the rough, planed or planed and fitted.

PRICE LIST OF FRAMES, PER POUND.

DESIGNATION.	Forged.	Planed.	Planed and Slotted.	Drilled and Fitted.
"American," solid,				
"American," built up,				
"Mogul," solid,				
"Mogul," built up,				
"Ten Wheel," solid,				
"Ten-Wheel," built up,				
"Consolidation," solid,				
"Consolidation," built up,				
Special,				

CONNECTING RODS.

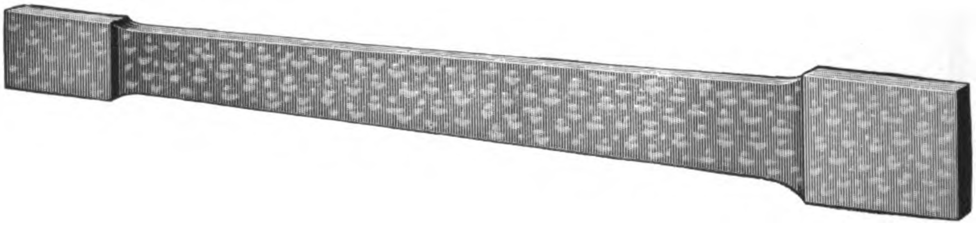


FIG. 14.

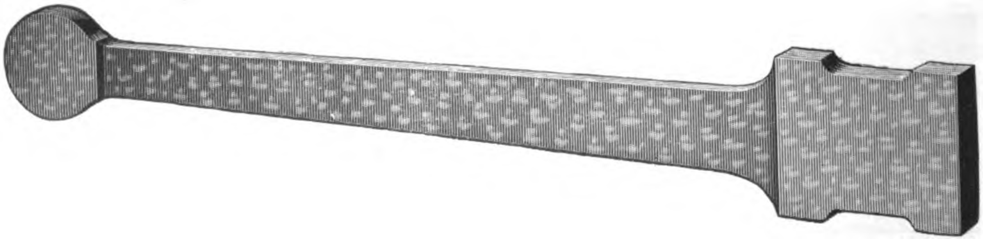


FIG. 15.

COUPLING RODS.

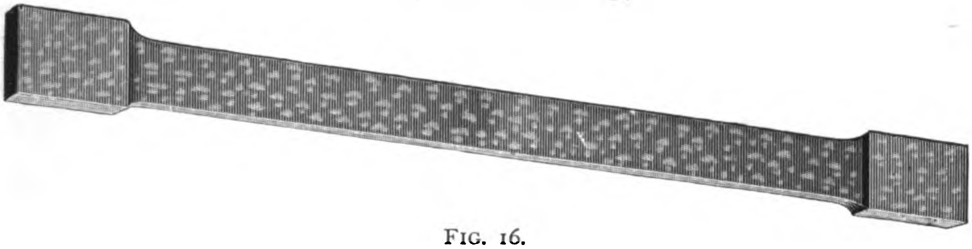


FIG. 16.

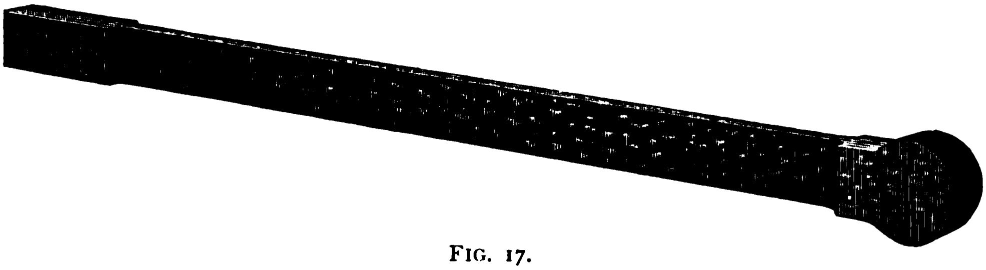


FIG. 17.

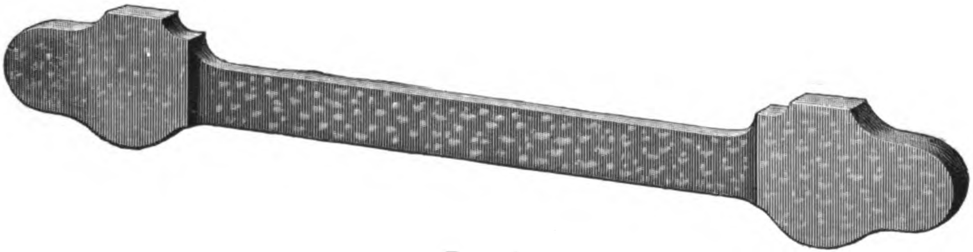


FIG. 18.

STRAPS.

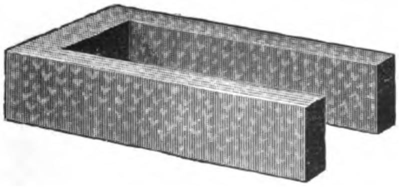


FIG. 19.

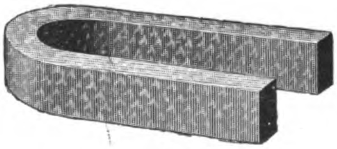


FIG. 20.

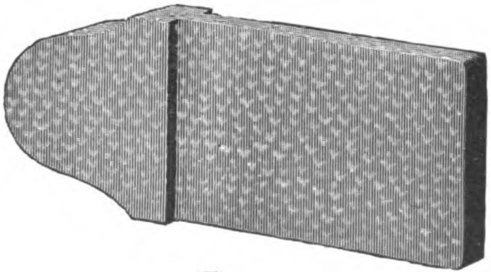


FIG. 21.

These rods and straps are made of the best hammered iron or forged open-hearth steel, and will be furnished rough, rough finished or finished to dimensions.

PRICE LIST OF RODS AND STRAPS, PER POUND.

RODS.

Reference No.	Forged.	Planed.	Planed and Milled.
Fig. 14, iron,			
" 14, steel,			
" 15, iron,			
" 15, steel,			
" 16, iron,			
" 16, steel,			
" 17, iron,			
" 17, steel,			
" 18, iron,			
" 18, steel,			

STRAPS.

Reference No.	Forged.	Planed.	Planed and Slotted.
Fig. 19, iron,			
" 19, steel,			
" 20, iron,			
" 20, steel,			
" 21, iron,			
" 21, steel,			

YOKE PLATES.

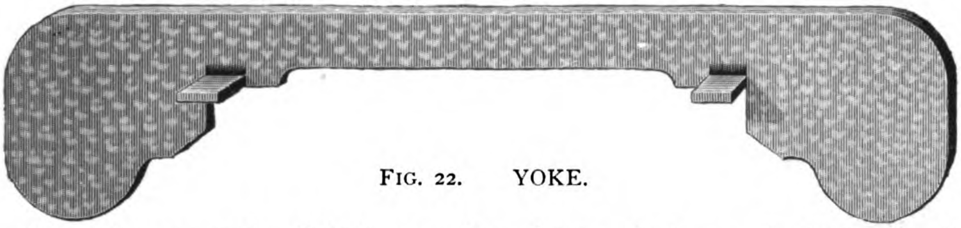


FIG. 22. YOKE.

The yokes are made of the best quality of wrought iron, and will be furnished rough as shown in FIG. 22, or rough finished or finished to dimensions.

PRICE LIST OF YOKES, PER POUND.

TYPE OF ENGINE.	Forged.	Planed.	Planed and Milled.
"American,"			
"Mogul,"			
"Ten-Wheel,"			
"Consolidation,"			
Switching,			

GUIDE BARS.

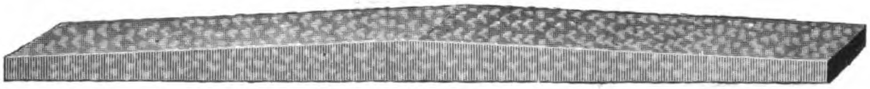


FIG. 23.

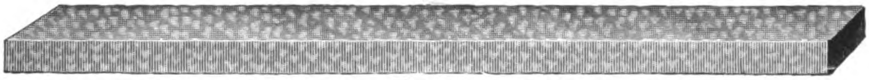


FIG. 24.

Guide bars are made of forged steel, case-hardened wrought iron or cast iron, and will be furnished rough, rough finished, or finished to dimensions.

PRICE LIST OF GUIDE BARS, PER POUND.

REFERENCE NO.	Rough.	Rough Finished.	Finished.
Fig. 23, forged steel,			
" 23, cast iron,			
" 23, case-hardened iron,			
" 24, forged steel,			
" 24, cast iron,			
" 24, case-hardened iron,			

REVERSING SHAFTS.

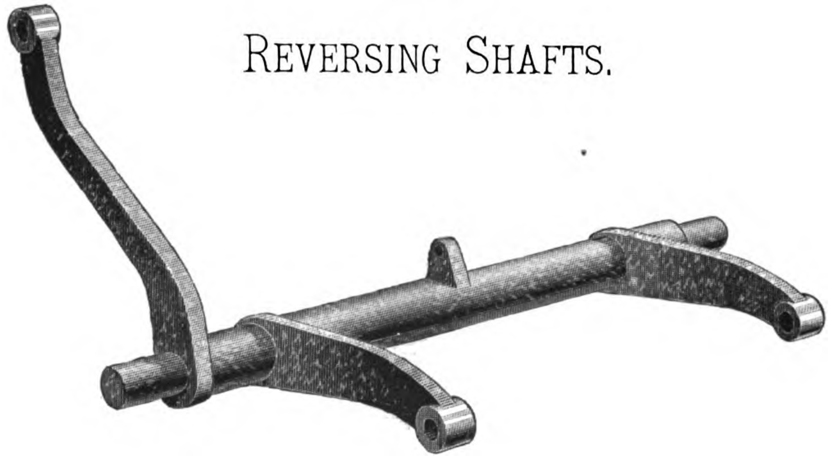


FIG. 25.

The above are made of the best quality of wrought iron, forged solid, and will be furnished rough, rough finished, and finished to dimensions.

PRICE LIST PER FORGING.

Forged.	Rough Turned.	Finished.

ROCKERS.

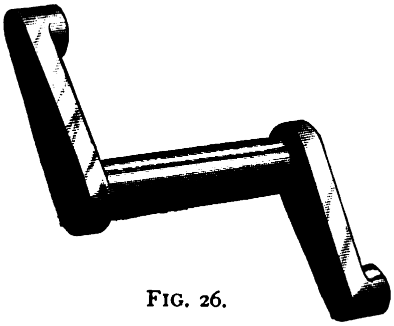


FIG. 26.

These are made of forged steel, best wrought iron, cast steel or charcoal iron, and will be furnished rough, rough finished or finished to dimensions.

PRICE LIST.

MATERIAL.	Rough.	Rough Turned.	Finished.
Steel Forging,			
Steel Casting,			
Wrought Iron,			
Charcoal Iron,			

EQUALIZING LEVERS.

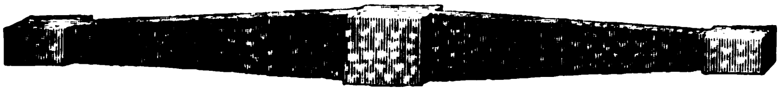


FIG. 27. MAIN EQUALIZING LEVER.

FIG. 28. TRUCK EQUALIZING LEVER.

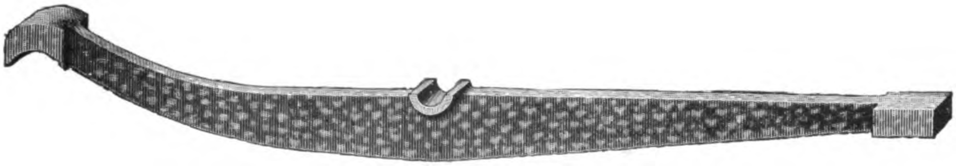


FIG. 29. PONY TRUCK EQUALIZING LEVER.

These equalizing levers are forged from the best selected scrap iron, and are thoroughly sound.

PRICE LIST, PER POUND.

REFERENCE MARK.	Forged.	Drilled and Slotted.	Finished.
Main,			
Truck,			
Pony Truck,			

TRUCK DETAILS.

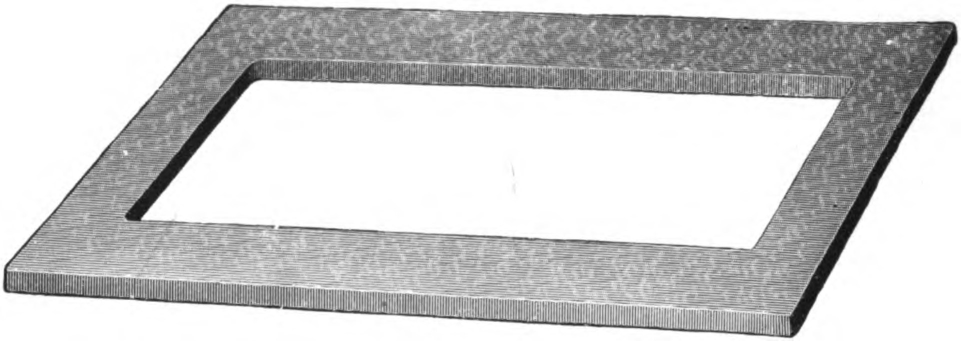


FIG. 30. ENGINE OR TENDER TRUCK FRAME.

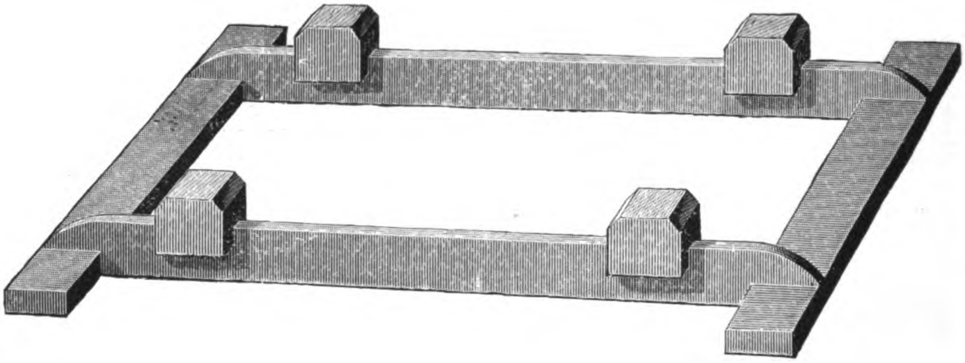


FIG. 31. ENGINE PONY TRUCK FRAME.

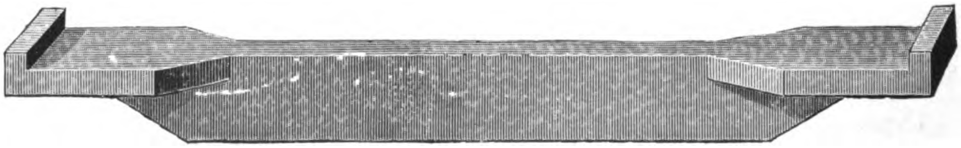


FIG. 32. TRANSOM BEAM.

The truck frames and braces illustrated are forged from the best selected wrought-iron scrap, and are thoroughly welded and sound throughout.

PRICE LIST, PER POUND.

NAME OF PART.	Forged.	Planed.	Planed and Drilled.
Engine or Tender Truck Frame.			
Pony Truck Frame.			
Transom Beam,			

JACK SCREWS.

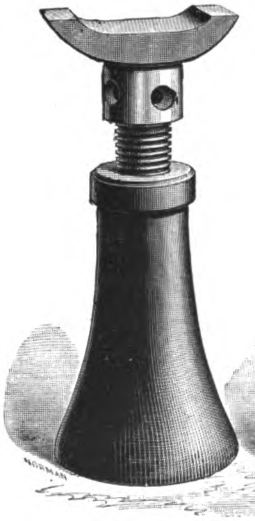


FIG. 33.

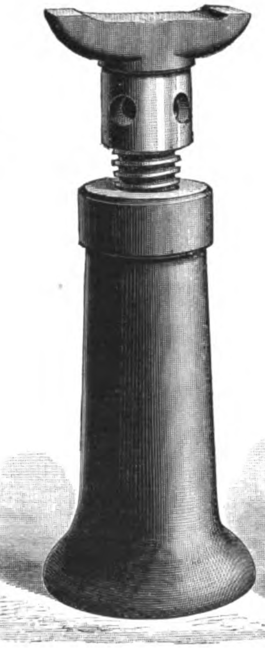


FIG. 34.

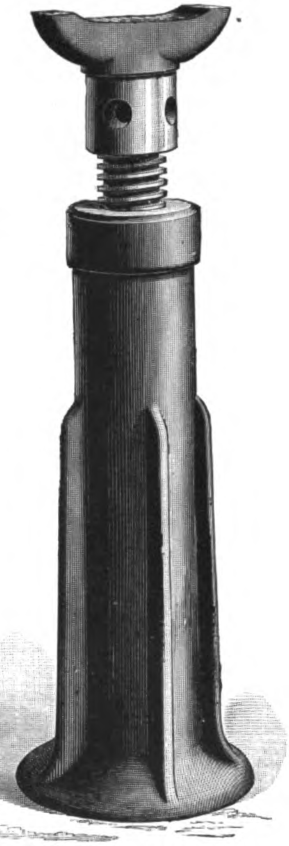


FIG. 35.

The jack screws herewith illustrated are such as we make and furnish with our locomotives, and which we also keep on sale. They are of the best quality of material and workmanship.

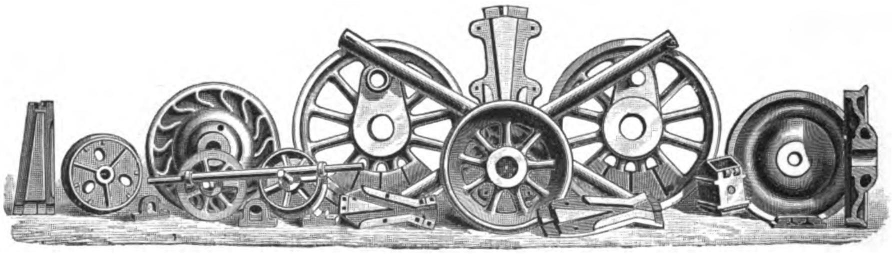
PRICE LIST OF JACK SCREWS.

REFERENCE No.	Height over all.	Diameter of Screw.	Lift.	Price, each.
Fig. 33,	15½"	2"	7"	
" 34,	21½"	2⅜"	11"	
" 35,	28½"	2⅜"	17"	

OTHER DETAILS.

Besides the locomotive details illustrated on the preceding pages THE DICKSON MANUFACTURING CO. make and will give prices for all details usually made by locomotive builders.

They also manufacture many of the parts which are used about railroads, such as Frogs, Axle Boxes, Mining-Car Wheels and Axles, etc., etc.



Short Sketch of Steam Locomotion.

The problem of steam locomotion upon common highways in England was so successfully solved in the early part of this century, that when the idea of such locomotion upon special roads was broached it met with an opposition which was in a certain sense double. Not only was fast locomotion by steam considered visionary in itself by people in general, but those who had been sufficiently energetic to persist in bringing their common road locomotives into a degree of practical shape were opposed to any competition. At the dawn of the railroad era the steam engine for general purposes had reached a considerable degree of perfection, and Watt and Murdoch had introduced most of those features which made it so. The compound engine had been invented by Hornblower, but remained unrecognized as a machine of much merit for many years.

It is not surprising that when the force of steam was finally recognized, thoughtful men were scheming to utilize it for locomotion, naturally upon common roads first. The idea of a special hard and level road for this purpose, it is conceivable, occurred to many of the workers ; but such a project was doubtless dismissed as soon as any serious thought was given to it ; on account of its enormous cost.

It may not be generally known that even Sir Isaac Newton lent his wonderful mind to this problem, but such is a fact, and he was probably the first to make an effort in this direction. He proposed, in 1680, a form of steam carriage, which consisted essentially of a spherical boiler on wheels, the boiler having a nozzle directed backward, through which the steam escaped as it was formed, and reacted upon the atmosphere. In this way it was proposed to urge the boiler and carriage forward.

It is not the purpose of this account to go into an extended notice of the different attempts to apply steam to locomotion, but a record of the names of the more important experimenters, with a few remarks upon the salient features of their work, may prove interesting.

Dr. Robinson, in 1759, and Dr. Erasmus Darwin, in 1765, drew respectively Watt's and Poulton's attention to the possibility of steam locomotion, and in 1768 a young man named Edgeworth published a paper on the subject.

Nathan Read (*b.* 1759, *d.* 1849), a native of Warren, Massachusetts, and a graduate of Harvard College, obtained a patent for a steam carriage in 1790. There were two horizontal steam cylinders, the piston rods of which terminated in racks which geared into a ratchet arrangement on the front axle. The exhaust was to be turned backward in order to utilize the reaction on the air. (!) Only a model of this engine was made.

It is considered that the first actual experiment was made by a French army officer, Nicholas Joseph Cugnot, who, in 1769, made a road locomotive, and in 1770 another. These engines worked by means of racks and pinions, and one of them, probably the second, attained a speed of two and one-quarter miles per hour.

James Watt patented a locomotive in 1784, and his assistant, Murdoch, in the same year, made a model of a locomotive with a beam engine, the beam being pivoted at one end and connected with the piston rod at the other, the connecting rod taking hold at an intermediate point. Neither Watt nor Murdoch gave any further attention to the locomotive.

Oliver Evans, born in Newport, Del., in 1755 or 1756, the first to build a steam engine which utilized the expansive force of steam, applied for a patent for a steam carriage in 1786, but his application was refused. In 1800, or thereabout, he began the construction of a locomotive which he did not finish.

In 1804, Evans built a flat-bottomed craft for the city of Philadelphia, which propelled itself either on land or in the water, its name being "Oruktor Amphibolis." Evans used in this vehicle the form of beam engine usually associated with his name. He planned and used at about this time the types of boiler now generally used in England, viz.: the Cornish and Lancashire boilers.

In 1786, William Symmington, in England, assisted by his father, made a working model of a steam carriage, which did not, however, lead to important results.

In 1782, Richard Trevithick, a pupil of Murdoch's, made a model of a steam carriage, which is now in the South Kensington Museum, London. He built the first full size engine in 1783, with the assistance of Vivian, at Camborne. This carriage was apparently successful, but was shortly dismantled. Trevithick dispensed with the condenser, and used high-pressure steam.

In 1821, Julius Griffiths, of Brompton, Middlesex, England, patented and built an elaborate steam carriage containing a water tube boiler and an air surface condenser. It seems only to have been used experimentally.

"During the succeeding ten years the adaptation of the steam engine to land transportation continued to attract more and more attention, and experimental road engines were built with steadily increasing frequency. The defects of these engines revealing themselves on trial, they were one by one remedied, and the road locomotive assumed a shape which was mechanically satisfactory. Their final introduction into general use seemed at one time only a matter of time. Their non-success was due to causes over which the Legislature and the general public, and not the engineer, had control, as well as to the development of steam transportation on a rival plan."*

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* Thurston, "Growth of the Steam Engine."

In 1822, David Gordon invented a road engine about which little is known, although it was introduced by Mr. Goldsworthy Gurney. At about this time Mr. Gurney made what was probably the first ammonia engine ever constructed. Gurney later experimented with an engine having jointed legs like a horse, and in 1827 he built a steam carriage which was reasonably successful for those days. In 1828 he improved upon the carriage of 1827, and built one having a high-pressure sectional boiler and an engine which is said to have been of good design, and to have had some modern features.

Sir James Anderson and W. H. James built a carriage having a sectional boiler carrying a working pressure of 300 lbs. per square inch, and went at the rate of 12 to 15 miles per hour.

Walter Hancock successfully persevered with the introduction of steam road wagons. His first engine had three wheels, the front one being used as a steering as well as a carrying wheel. This wheel, as it swiveled, carried with it two oscillating engines, the axle of the wheel being "cranked" to receive the connecting rods.

At this time, about 1831, there was great activity among inventors, and creditable results were obtained. Hancock's first engine ran regularly without once failing to do its work, and later a second carriage did equally as well. Sir Charles Dance's carriage of the same date traveled 3,500 miles in four months, and carried 3,000 passengers and maintained a speed of 10 miles per hour. Ogle & Summers' carriage maintained a speed of some 30 miles per hour, and similar successes were secured by Colonel Macerone in 1833, Heaton and others. Among many competitors, Hancock was in the lead, and his carriages "Infant," "Eva," "Enterprise," "Erin," and others, were very successful amidst much opposition, attaining speeds up to 20 miles per hour. Commercially, however, common road steam locomotion was unsuccessful, and at the time of the advent of special iron railroads the common road locomotive began to die a natural death, notwithstanding the facts that iron railroads were enormously expensive, and that steam carriages were well perfected.

In this country the roughness of the roads was a complete barrier to the introduction of road engines, and even in England the roads of a century or less earlier would have had the same effect.

The tramways were the precursors of the railroad, and their advantages, where heavy loads were to be drawn, were well known centuries ago. It is a common thing in England to see flat iron plates or flat stones laid in line in the streets of cities on which heavy carting is done. The stoneway was the original and proper tramway, and was laid in coal mines, and at their entrances. These, in 1630, were replaced in England by heavy timbers, and were introduced by a man named Beaumont. The tramways became recognized as a very economical means of facilitating heavy traffic, and the lines were made quite level. The tops of the timbers were rounded, and fitted a grooved wheel. To trace the evolution of the modern rail for railroads is unnecessary here, as there have been many forms, and practice is not by any means uniform, even at present.

At the very beginning of this century, what can properly be called a railway, or railroad, was to be found in many parts of England, the motive power being horses. The horse, in fact, maintained his proud position as the motive power of railroads until he was positively driven from the field by steam, and many persons will recall with feelings of amusement, reproductions of an old engraving showing the opening of the Stockton & Darlington Railroad in 1815, in which is represented the comical spectacle of a horse walking ahead of the locomotive, and bearing on his back his rider, who proudly bore a banner. Doubtless, it can be imagined, this rider felt more pride in his horse than in the modern absurdity of a steam locomotive.

Richard Trevithick, previously mentioned in connection with steam on common roads, was naturally early (1804) in the field with a railroad locomotive, which actually worked on the Welsh Pen-y-darran road. The boiler was a cylinder, through which was a cylindrical flue holding the fire. The engine rested on four wheels of uniform size, the rear ones being the driving wheels, the crank pins of which were connected to a long transverse cross head by long vertical links, or connecting rods. There was one vertical cylinder half immersed in the steam space of the rear of the boiler, above which was the cross head referred to, guided in its motion by bars. This type of engine seems to have been that to which all efforts of inventors converged for years. It was obviously never destined for speed, and all that can be said of it is that it could pull more than a horse and did not become tired. One cylinder gave place to two, and in order to couple the wheels together by a rod and yet secure the advantages of cranks at right angles to each other, the connecting-rod pins of one pair of wheels were on a return crank from the coupling-rod pins. Some of these old engines can be seen in England at present, and the writer believes that he is correct in saying that a few of them are still in service.* They were grotesquely ornamented, and are a striking instance of the fact that ornamentation in the early days of machine design played a very important part. Happily, in England the ornamentation of locomotives has absolutely ceased. In this country it is disappearing, and it is to be hoped will soon exist only in memory. Beauty in machine design will be recognized only in the perfection with which ends are accomplished, in the harmony of the proportions, and the beauty of simple lines.

In America, Colonel John Stevens, of Hoboken, N. J. (*b.* 1749, *d.* 1838), in 1812 predicted that a speed on railroads up to 100 miles per hour would be possible with steam engines, and that rates of twenty to fifty miles per hour would be common, which must be considered a remarkable prediction.

At about this date (1812) some doubt was expressed that the adhesion of wheels on rails would be sufficient to utilize the tractive force from the cylinders, but in a short time this matter was settled. Hedley proposed, in 1812, to sprinkle ashes on the track in case the wheels slipped. He, therefore, virtually invented the sand box.

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* Photographs of these, as well as of modern English locomotives, can be purchased of R. H. Bleasdale, Park Road, Birmingham, England.

The credit of solving the problem of steam-railroad locomotion is generally given to George Stephenson,* a self-made man, born in Wylam, near Newcastle-upon-Tyne, June 9, 1781, and died at Tapton House, on the Midland Railway, on August 12, 1848. He could neither read nor write until he was nineteen or twenty years old. Up to that age he was not considered unusually intelligent, but was a "good, sober, steady lad." He formed models of engines in clay, and was exceedingly ingenious. At about 1801, he learnt how to cobble shoes and clean clocks. His attention was early directed to locomotives, as he was the son of a miner and worked about mines in his youth. He built his first engine at Killingworth, England, in 1814, and in 1815 another, neither of which differed greatly from others of the same period. He continued his study of the locomotive, and, toward the completion of the Manchester and Liverpool Railway, in 1829, Stephenson, against great opposition, prevailed upon the directors to make a trial of steam locomotives. Accordingly, the board decided to offer a reward of £500 for the best locomotive which would fulfill the conditions laid down in the following circular:

RAILWAY OFFICE,
LIVERPOOL, April 25, 1829.

STIPULATIONS AND CONDITIONS on which the Directors of the Liverpool & Manchester Railway offer a Premium of £500 *for the most Improved Locomotive Engine.*

1st. The said engine must "effectually consume its own smoke," according to the provisions of the Railway Act, 7th Geo. IV.

2d. The engine, if it weigh six tons, must be capable of drawing after it, day by day, on a well-constructed railway, on a level plane, a train of carriages of the gross weight of twenty tons, including the tender and water tank, at the rate of ten miles per hour, with a pressure of steam in the boiler not exceeding 50 pounds on the square inch.

3d. There must be two safety valves, one of which must be completely out of the reach or control of the engine man, and neither of which must be fastened down while the engine is working.

4th. The engine and boiler must be supported on springs, and rest on six wheels; and the height from the ground to the top of the chimney must not exceed fifteen feet.

5th. The weight of the machine with its *complement of water* in the boiler, must, at most, not exceed six tons; and a machine of less weight will be preferred, if it draw after it a proportionate weight; and if the weight of the engine, etc., do not exceed five tons, then the gross weight to be drawn need not exceed fifteen tons; and in that proportion for machines of still smaller weight—provided that the engine, etc., shall still be on six wheels, unless the weight (as above) be reduced to four tons and a half, or under, in which case the boiler, etc., may be placed upon four wheels. And the company shall be at liberty to put the boiler, fire tube, cylinders, etc., to the test of a pressure of water not exceeding 150 pounds per square inch, without being answerable for any damage the machine may receive in consequence.

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* See Lives of George and Robert Stephenson," by Samuel Smiles. London and New York, 1868. See "Life of Robert Stephenson," by J. C. Jeaffreson and William Pole. London, 1866.

6th. There must be a mercurial gauge affixed to the machine, with index rod, showing the steam pressure above 45 pounds per square inch, and constructed to blow out a pressure of 60 pounds per square inch.

7th. The engine to be delivered complete for trial at the Liverpool end of the railway not later than the 1st of October next.

8th. The price of the engine which may be accepted not to exceed £550, delivered on the railway; and any engine not approved to be taken back by the owner.

N. B.—The Railway Company will provide the *engine tender* with a supply of water and fuel for the experiment. The distance within the rails is four feet eight inches and a half.

This circular brought out a number of engines, only four of which were entered for trial at the postponed day (October 6, 1829), viz.: the "Novelty," by Messrs. Braithwaite and Ericsson (the latter of "Monitor" fame, now of New York); the "Rocket," built from Stephenson's designs; the "Sanspareil," by Hackworth; and the "Perseverance," built by Burstall. The "Sanspareil" was too heavy, the "Perseverance" could not attain the specified speed, and the "Novelty" ran at the rate of 28 miles per hour at times, but was withdrawn on account of the failure of its blower. The "Rocket" was thus left alone, and was perfectly successful. She made a speed of 12 miles per hour on the first trial, and later a speed of 30 miles per hour.

"The running ground was a dead level, about ten miles from Liverpool, on the Manchester side of the Rainhill Bridge, at a place called Kenrick's Cross. The whole country was alive to the great event. From 10,000 to 15,000 people of both sexes and all ranks assembled to witness the novel contest. To accommodate the ladies, among whom was Robert Stephenson's wife—anxious and hopeful for her husband—a booth had been erected at either end of the race-course, a few yards from the rails. Bands of music enlivened the entertainment."*

The "Rocket" was obliged to run a total distance of 70 miles over a length of line of 1½ miles. It therefore ran over the line about fifty times.

The success of the "Rocket" was due to two peculiarities, viz.: her multitubular boiler, and to a contracted exhaust nozzle at the base of the chimney. The invention of these features was claimed for several persons; but while it is known that the exhaust blast was used before the "Rocket's" time, once by George Stephenson himself, and earlier by Mr. Hedley in his second Wylam locomotive (1813), the effect on the fire of contracting the nozzle was not known. In the second Wylam engine, in order to do away with the noise of the exhaust, which at first passed out of the side of the engine, over the driving wheel, it was conducted to a chamber, and then in an expanded state through a pipe turned upward into the chimney. It is claimed by some that workmen upon repairing this pipe had for some purpose contracted the end, and upon using the engine again were surprised to find that the draught had been improved and that the engine steamed better.

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* Jeaffreson & Pole.

This, however, does not appear to have impressed those concerned. George Stephenson used a similar arrangement in his first Killingworth locomotive, but without the receiver, and from the peculiar noise made by the exhaust it was called "Puffing Billy." A writer* in the *Engineer* (London), in 1884, says that the contracted exhaust nozzle was suggested by Henry Booth, Secretary of the Liverpool and Manchester Railway Company. As far as England is concerned, it is certain that Mr. Booth invented the multitubular boiler. It is said, however, that a Monsieur Seguin patented such a boiler a few years before in France, and that Mr. Stevens used one in this country in 1807.

The credit of the general design of the "Rocket" is not due solely to George Stephenson, as is often supposed, but quite as much to his son Robert, who was general manager of the firm of Robert Stephenson & Co.† This firm was established by George Stephenson in 1823, and his son was immediately put at its head, at the age of twenty years. Robert was, therefore, in immediate charge of the design and construction of the "Rocket"—a charge which he executed most conscientiously, while his father was the engineer of the construction of the line on which the engine was to run. They were in constant correspondence concerning the "Rocket" while she was being built.

The development of the modern locomotive from the "Rocket" need not here be described; for although there have been many attempts to depart from its principles, it is remarkable that the locomotive of to-day, in all countries, possesses the essential features which made the "Rocket" successful, viz.: the tubular boiler, the contracted exhaust nozzles directed up the chimney, the water leg fire box, and cylinders on the sides of the engine with their piston rods directed towards the axle centre, and connected to the crank pin by a single rod, whose axis is in a vertical plane, passing through the crank pin and the axis of the piston rod.‡

Turning now to America, engineers in this country closely watched the development of railroads, and early availed themselves of the improvements, besides making improvements themselves. Colonel John Stevens, previously mentioned, had a small locomotive built in 1825,* and placed upon a circular railway in front of his house—now Hudson Terrace—at Hoboken, to substantiate his claims. It, however, created no permanent interest.

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* For an extended controversy concerning the "Rocket," and the identity of the "Rocket" at the South Kensington Museum, London, see the *Engineer* for the last half of 1884.

† The company still exists.

‡ For an interesting account of the "Atmospheric System" of railroad car propulsion, which threatened to displace steam locomotives, see Jeaffreson & Pole.

The first line of rails for business service in this country was laid in Quincy, Mass., in 1826 and 1827, for the purpose of carrying granite from a quarry to the Neponset River. The second railroad was built in 1827, from the coal mines at Mauch Chunk, Pa., to the Lehigh River, a distance of nine miles. Quickly following this the Delaware & Hudson Canal Co. in 1828 built a line from their coal mines to the end of the canal at Honesdale, Pa., to be worked by gravity and horses or mules.

The Delaware & Hudson Canal Co. were singularly alive to the importance of steam locomotives, and therefore sent their then engineer, Mr. Horatio Allen, to be present at the Rainhill trial on the Liverpool & Manchester Railway, and carefully observe the engines. He was given authority to purchase three locomotives and the iron for the road. He had already shipped one locomotive, the celebrated "Stourbridge Lion," built by Foster, Rastrick & Co., of Stourbridge, England, and this was the first locomotive for commercial service in America. Concerning this engine, the following appears on a testimonial (now in the possession of the Dickson Manufacturing Company) to the late Thomas Dickson, given to him in 1874 by the Delaware & Hudson Canal Co., of which Mr. Dickson was then president:

"The Railroad from Honesdale, Pa., to the Mines, was commenced in 1827, and completed in 1829. The First Locomotive that ran upon a railroad on this Continent was imported from England by this Company, was ordered by Horatio Allen, Assistant Engineer, was shipped from Liverpool April 8, 1829, on board the Packet Ship 'John Jay,' arrived in New York 17th May, 1829, was sent up the river to Rondout, and arrived there 4th July, 1829, from thence was transported by Canal, and arrived at Honesdale July 23, 1829, and on the 8th of August, 1829, made the trial trip. This Locomotive was built at Stourbridge, England, was named the 'Stourbridge Lion,' and the Boiler is now in use at Carbondale, Pennsylvania."

This engine proved to be too heavy for the rails, and almost immediately after the trial was laid aside.

The boiler of the "Stourbridge Lion" was a simple wrought-iron cylinder with a single flue passing from end to end, in which was the fire. The two cylinders were vertical and were bolted to a casting, which formed the rear head of the boiler. They were placed so far apart that their axes were in the same fore and aft vertical plane with the crank pins, which were outside of the wheels. The piston rods passed through the upper cylinder heads, and were connected each to a pin in the end of a beam, there being a beam on each side of the engine. This beam pin was guided in its vertical motion by the usual parallel motion, the fixed point of which was firmly held in place by wrought-iron braces. The opposite end of the beam moved on a fulcrum pin at the top of a pair of long vertical vibrating wrought-iron rods springing from the side of the boiler, a little in the rear of the chimney. Between the piston rod and the fulcrum of the beam were pins for the connecting rod, parallel motion, and a feed pump, the former being near the piston rod. The connecting rod directly connected the beam pin with the crank pin below, and was provided with strap ends and keys. On the forward side of the lower strap was forged a boss, to which the coupling rod to the forward wheel was connected by a pin joint. The crank pins on opposite sides were at right angles to each other.

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* Thurston.

The valves were simple D slides, moved by eccentrics on the rear axle. The eccentric rods were of wrought iron, and were horizontal and directed backward, the motion becoming vertical by means of bell cranks. The vertical rod from each bell crank engaged with a horizontal lever, which gave a reverse motion to the valve stem. The travel of the valve appears to have been varied by connecting the vertical rod to different points of the horizontal lever referred to, but the writer is not familiar with the means of reversing the engine.

The exhaust steam was conducted under the boiler to the front end, and then turned upward outside of and in front of the boiler, and entered the chimney just above its union with the smoke box. The chimney was a simple straight pipe of considerable height.

The beams were each made of two ⅜-in. wrought-iron plates three inches apart, six feet long between end centres, 8¾ in. deep, and thickened by bosses forged on at the points penetrated by pins. The space between the halves of the beam was covered with sheet iron, top and bottom, except where the vibration of rods prevented it. This sheet iron was pierced here and there for oil holes, and was secured to distance pieces by means of square-headed screws, with their sides all at right angles and parallel to the sides of the beam. The pins for the parallel motion and fulcrum were overhung on each side of the beam, and were in one piece in each case, and passed entirely through the beam.

The wheels were made with iron hubs and tires, and wood spokes. The crank pins projected from iron rings. On the opposite side of each wheel was a similar ring joined to the first by cross pieces which, with the rings, completely embraced each spoke in a very substantial manner. In addition to this, a rivet passed completely through each spoke and the rings.

The frames were of bar iron.

Persons who saw the locomotive uniformly testify to the excellence of the workmanship on all its parts.

Many details of this locomotive are about the anthracite coal district. The cylinders are now in use by the Pennsylvania Coal Company, for pumping engines.

In 1830 a locomotive, built by Peter Cooper in the year before, was tried at Baltimore, on the Baltimore & Ohio Railroad, and attained a maximum speed of eighteen miles per hour. Superiority to the "Rocket" has been claimed for it, but as the "Rocket" possessed features which have never been eliminated from locomotives, such a claim would appear groundless. The cylinders were 3½ inches in diameter by 14½ inches stroke. The wheels were 30 inches in diameter, and worked by gears from the crank shaft. It weighed less than a ton, developed 1.43 horse power, and drew a gross weight of 4½ tons. The tubes in the boiler were gun barrels.

"Messrs. Davis & Gartner, a little later, built the 'York' for this road—a locomotive having also a vertical boiler, of very similar form to the modern steam fire-engine boiler, 51 inches in diameter, and containing 282 fire tubes, 16 inches long, and tapering from 1½ inch diameter at the bottom to 1¼ at the top, where the gases were discharged through a combustion chamber into a steam chimney. This engine weighed 3½ tons."*

They afterward built the so-called "Grasshopper" engines, which did good work. One or two of them are still at work, and of these one was exhibited at the Centennial Exhibition of 1876. The "Atlantie" was the first one, and was built in 1832.

Mr. E. L. Miller, of Charleston, S. C., was present with Horatio Allen at the Rainhill trial, and on his return from England ordered, of the West Point Foundry, a locomotive for the Charleston & Hamburgh Railroad. It was built in the summer of 1830, reached Charleston in October, and was named the "Best Friend." It had a vertical tubular boiler at one end and two inclined cylinders at the other or leading end, which worked the cranked axle near the boiler. The four wheels were coupled, and were 4½ feet in diameter. The weight was 4½ tons. This engine worked well for eight months, when, from carelessness, it was hopelessly wrecked by the explosion of its boiler.

In the "Best Friend" was a germ of the modern locomotive in these respects: that the cylinders were at the front end of the locomotive, and that the driving wheels were coupled. The "West Point," built in 1831, was similar to the "Best Friend," but it had a horizontal tubular boiler, and the cylinders were at the back end of the engine.

A very successful locomotive was built in 1831 by the West Point Foundry for the Mohawk & Hudson Railroad. Its name was "De Witt Clinton," and it hauled five cars at the rate of 30 miles per hour.

Horatio Allen, being a pioneer in locomotive introduction, was frequently consulted with reference to them, and he designed a double-end engine in 1831 named the "South Carolina." It had two pairs of driving wheels near the middle, and a pair of truck wheels under each end. It was the first eight-wheeled engine ever built, and resembled the double-end Fairlie engine in appearance.

In 1832, a successful engine was built by Messrs. Davis & Gartner, of York, Pa., which was put on the Baltimore & Ohio R. R.

At about this time the first locomotive was built which had the distinctive feature which characterizes the modern "American" type of locomotive, viz.: the four-wheeled swivel or bogie truck. It was the "American," built by the West Point

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* Thurston.

Foundry, in 1832, from plans furnished by John B. Jervis, Chief Engineer of the Mohawk & Hudson Railroad. It had cylinders 9½ by 16 inches, and four coupled driving-wheels 5 feet in diameter. It ran very smoothly, and is said to have attained a speed at the rate of 80 miles per hour for a short distance. The driving wheels were behind the fire box.

The bogie truck of the "American" locomotive was later given a side motion by some builders, and the resulting flexibility combined with that due to equalizing levers has in a great measure made possible the rapid extension of railways in this country which we witness. If the "American" engine was of such a nature that it required an expensive road to run upon, capital would have been much slower in seeking such channels for investment.

From 1832 the number of locomotives built in this country rapidly increased, and although there were many designs, they all converged into the "American" type with which we are now so familiar. Its present form is due to the late William Mason, of Taunton, Mass., who was the first to spread the truck wheels and place the outside cylinders in a horizontal position, and to use the present form of bar frame. These things he did in 1853-54.

Of late years there have been few changes made, except in proportioning the parts better and increasing sizes, so that some locomotives are capable of developing 1,000 horse-power, and drawing heavy trains at a high rate of speed. That positive improvements in locomotives are near at hand is only in the nature of things, for they may safely be considered to have reached nearly a limit in size, and they now demand better means of utilizing the power of steam.

◆

ALPHABETICAL LIST

OF THE VARIOUS

Productions of the Shops of The Dickson Manufacturing Company.

Air compressors and receivers.
" ~~dry refrigerators, Lightfoot's patents~~.
Amalgamators.
Anthracite coal breakers, with removable steel teeth.
Anti-friction bearings for bridges.
Annular coal screens.
Automatic cartridge oilers.
Axles, locomotive, car and mine.
Automatic cut-off engines.

Band wheels of all sizes.
Blast engines for furnaces and steel works.
Blast valves.
Blast pipes.
Blower-boots, iron for.
Boilers—locomotive, fire box, return tubular, return flue, Cornish, Lancashire, cylinder and vertical.
Bobs at right or acute angles for pumps.
Bolts and bolt ends, all sizes.
Brackets for balconies.
Brass castings of every variety.
Breeches pipes for angular connections.
Bridge castings and forgings.
~~Brotherhood triple cylinder engines~~.
Buckets, iron, for hoisting; buckets, iron, for bailing.
Bull pumps, Bessemer steel forgings.
Bush hammers.
Boring rod, joints and drills.
Bumper plates for mine cars.

Cable machinery of all kinds.
Caulking tools.
Cages—hoisting for mines.
" landing fans.
Cams for trip hammers, etc.
Cambering machines.
Canopies for safety cages.
Car wheels—cast chilled wheels of all sizes, double and single plate and spoke.
Car wheels—spring plate, steel tired.
" " mine.
Cars for mines of all kinds.
Carrier pulleys.
Castings of iron and brass of all kinds.
Cast-iron fronts and columns for buildings.
Case-hardened motion work for engines.
Catch-box gears.
Causeway rings and covers.
Cast gears of all sizes.
" " bevel and miter.
Cell doors and gratings.
Chambers, pump and valve.
Chisels, cold.
Chute plates of all kinds.
Circular saw arbors.
Clamp boxes, clevises.
Clutch plates and couplings.
Clutch—umbrella friction, strap friction.
" friction of all kinds.
Coal crackers.
" breakers, main and pony rolls.
" breaker pinions.
" screens and shafts.
" mining machinery.
" preparing "
" conveyors.
" elevators.
Coiled expansion and heater pipes.
Column pipe for mine pumps.
Compressors.
Compound steam engines—horizontal, vertical and inclined.
Concentrating screens for lead, copper and silver.
Condensers.
Convertors for steel plant, Bessemer.
Cones for wire ropes.
Connecting rods—forged, rough, turned and finished.
Contractors' locomotives.
Counter and line shafting.
Cornish pumps and pumping engines.
Cornish boilers.
Cotters.
Cranks, crank shafts, crank-pin oilers.
Crab winches.
Crowbars.
Crown chain.
Crushers for phosphate and rock salt.
Culm burning grates and blowers.
Cupolas for smelting iron.
Cut gears, of all sizes.

Cable road machinery.
Collars, wrought-iron for shafts.
Columns, Phœnix shafts.
Couplings, flange, clamp, etc.
Counter-shaft hangers.
" " pulleys.
Corning rolls for powder mills.
Cranes—hydraulic.
" hand.
Cylinder boilers.
Corliss engines.

Derricks.
Derrick cars.
" Dickson " steam engines, all kinds.
Double cylinder reversible winding engines.
Drums—hoisting, plain, cylindrical, conical, and with parallel and spiral grooves.
Drum—rope driving and carrying.
" wire cable for cable roads.
Dump cars, iron, steel and wood.
Dump saddles.

Engines for air compressing.
" automatic cut off.
" blast for furnaces.
" " · " steel works.
" ~~Brotherhood triple cylinde~~r.
" compound.
" condensing.
" Cornish pumping.
" " Dickson" Corliss.
" direct acting hoisting.
" elevator hoisting.
" furnace "
" ~~gas, all sizes. The "Stockpor~~t."
" for gas pumping.
" geared hoisting.
" high-duty pumping.
" hoisting for mines, single and in pairs.
" horizontal.
" locomotive, all sizes.
" pneumatic transmission.
" rail mill reversing.
" ~~refrigerating by dry air. "Lightfoot'~~s.'
" rolling mills.
" steam stationary.
" supplies of all kinds.
" for ventilating fans.
" vertical.
Engineering, mechanical.
Exhaust, air fans.
Expansion joints.
Extracting device for breaker teeth.
Evaporating pans.

Fans for mine ventilation.
" Guibal mine ventilating.
Fly wheels, all sizes.
Forge blast engines.
Forge heating furnaces.
Forges, cast iron.
Forgings of iron and steel.
Friction clutches all kinds.
" wheels.
Frogs, railroad and mine.
Furnace blast engines.
" hoist "
Furnaces, heating.
Fusee or conical spiral drums.

Gates for blast.
" " water.
" and guides for chutes.
Gauges for gang saws.
Gauge cocks.
Gears—cast and machine cut.
" bevel, miter and spur.
" friction of all kinds.
Girders, T and arch.
Governors all kinds.
Grate bars of all kinds.
Grates, dumping and shaking.
" culm burning.
Gravity plane machinery.
Grindstone frames, cast iron.
Grooved pulley.
Guide rollers.
" pulley.
" " stand.

Hangers for shafts of all kinds.
High-duty engines.
Hitching posts.
Hoisting buckets.
" drums.
" engines.
" machinery, all kinds.
Hydraulic cranes.
" lifts.
" rail-sawing machines.
" pumps.
" presses for special heavy duty.
" wheel presses.

Inclined plane machinery.
" " rollers.
Inside connected mine locomotives.
" mine locomotives.
Iron castings of all kinds.
" forgings " "
" sash weights.

Jacks, hydraulic and screw.
Jars for boring rods.
Jet blower for boiler furnaces.
Jig shakers for separating coal.
Joint bolts.
Journal boxes and metals.

Keys for bolts.
Knives for planing machines.
Kettles, steam.

Lagged hoisting drums.
Lamp posts.
Landing fans.
Latches for railroad tracks.
Launch engines and boilers.
Lawn rollers.
Lead sash weights.
Lewis tools for mason work.
Lifters, track or rail.
Locomotives, all classes and gauges.
Locomotive parts.
" boilers.
" driving wheels.
" cylinders.
" forgings.

Machine-cut gears of large sizes.
Manifolds for steam heating.
Mason's sledge hammers.
Metallic piston packing.
Mine-pumping machinery.
Mining machinery.
Miter gears.
Mortise gears.
Multigrooved friction wheels.

Nozzles for blowers, etc.
Nuts—case hardened.
" hexagon and square.
" tapped, U. S. standard.
" wing or thumb.

Open-hearth steel forgings.
Ornamental cast-iron columns.
Outboard pedestal, with adjustable cap.
" " " side adjustment.
Oven castings for bakeries.
" " " tan-bark furnaces.
Overhead railings.

Packing for pistons.
Parallel spiral-grooved winding drums.
Paragon breaker teeth.
Pawls for ratchet wheels.
Pedestal, wall bracket.
" shaft.
Pedestal base plates.
" high beds.
" outboard.
" " with adjustable cap.
" " " side adjustment.
" special with bottom "
" adjustable.
" wall box.
Pentagonal coal screens, J. B. Smith's patent.
Perforated cast chute plates.
Piazza brackets, ornamental.
Pillow blocks of all sizes.
Pinion wheels of all kinds.
Pipe, column for mines.
" elbows.
" flange.
" petticoat for smoke stacks.
Pistons.
Piston rods, iron and steel.
Pipe, cast, of large sizes, socket and flange, up to 72 inches in diameter.
Pestle.
Plate-bending rolls.
Plantation locomotives and track.
Plate iron and steel.
Plumb bobs, all sizes.
Phosphate-breaker rolls, with removable teeth.
Phœnix shafts.
Pneumatic hoists.
Pokers for firing.
Pole pumps.
Pop safety valves.
Portable track.
" boilers.
Powder-mill machinery.
Presses, hydraulic and screw.
Protecting collars.
Puddle clay mill.
Punching machines for rail mills.
Poppet-valve engines.
Pumping machinery of all kinds.
Pulleys, balanced, solid and split.
" double flanged, double geared.
" carrier.
" clutch.
" friction.
" grooved.
" guide, with stand.
" large and small band wheel.
" mule, with stand.
" wire rope.

Quadrant safety catches for cages.
" racks for brakes.
Quarry hoists and derricks.

Racks, cast and wrought.
Railway frogs and crossings.
Rail-straightening machines.
Rails for car dumps.
Rakers for firing.
Rams, hydraulic.
Rattle boxes.
Reels for hoisting cables.
[redacted].
Regulators, all kinds.
Reversible engines, all sizes.
Roasting kilns for ores.
Rolls for breaking coal, salt and phosphate.
Rope transmission machinery.

Saddles for dump car.
Safeguards for hoisting shafts.
Safety valves, all sizes.
Safety catches, various styles.
Sash weights, iron and lead.
Saw arbors, steel and iron.
Scale picks.
Scoop shovels.
Scrapers for firing.
Screens for coal and stone.
  " " concentrating lead, copper and silver.
  " any diameter and pitch.
Scuttles for coal elevators.
Seamless brass and iron tubing.
Sectional cast-iron roasting kilns.
Selected iron scrap forgings.
Set screws, iron and steel.
 " bolts, " " "
Sewer pipe, cast iron.
Shafts, steel, iron, cold rolled, etc.
Shakers for screening coal, etc.
Shearing machines.
Sheaves for hoisting gravity planes, etc.
Sheet-iron, steel, copper and brass.
Shovels, all kinds.
Shrouded spur gearing.
Sidewalk grates.
Sinking buckets.
Skips for ore mines.
Slate-picking machinery.
Sledges, iron and steel.
Slicers for firing.
Slope machinery.
Smelting cupolas.
Smoke stacks, locomotive and stationary engines.
Sniffler cocks for pumps.
Snow plows.
Spherical valves for beer and tar liquid.
Spray feed for steam boilers.
Spur gearing, all kinds.
Stationary engines, all kinds.
Steam gauges.
Steam engines, all kinds.
Stone hammers, steel or iron.
Stub ends for connecting rods.
Studs and stud bolts.
Supplies for railways and collieries.
Switches for railroads.
Swivels.
Steam kettles.

Tackle blocks, iron.
Tanks.
Targets.
Teeth for breaker rolls.
Telegraph iron for chutes.
Tell-tale for winding engines.
Throttle valves, all sizes.
Tightening pulleys.
Tipples.
Track lifters.
Traction machinery.
Trammels, brass or iron.
Transfer tables.
Traps for steam.
Truck wheels.
Turnbuckles.

Umbrella frictions.
Universal couplings.

Vacuum pans.
Valves, globe, check, slide, etc.
Vaporizers for gas works.
Variable cut-off engines, all kinds.
Ventilating fans and furnaces.
Vertical engines, all kinds.
Vaporizing pans, cast or plate iron.

Wagons for mines.
Wheelbarrow wheels, iron.
Whistles, locomotive and signal.
Wickets for furnace doors.
Winding drums, all kinds.
  " indicators.
Windlass wheels.
Wine bores strainers.
Window sash weights, lead and iron.
Wire-netting spark arresters.
Worm wheels, all sizes.
Wrecking cars.

Zinc rolls for powder mills.

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